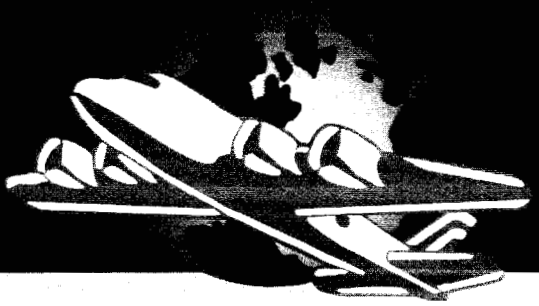
JOURNAL OF AIR TRANSPORTATION



Leading the world in aviation scholarship

VOLUME 9, NUMBER 1—2004

Journal of Air Transportation

Volume 9, Number 1 – 2004

ISSN Number: 1544-6980

Library of Congress Catalog Number
HE9761.1 J68

Journal of Air Transportation Volume 9, Number 1 – 2004

Brent D. Bowen, Editor

Published by:
Aviation Institute
University of Nebraska at Omaha
6001 Dodge Street
Omaha, Nebraska 68182-0508
USA

Phone: (402) 554-3424
Fax: (402) 554-3781
E-mail: journal@unomaha.edu
World Wide Web: http://jat.unomaha.edu

Printed by: EbscoMedia, Birmingham, Alabama

Published as a not-for-profit service of the Aviation Institute. Funded in part by a grant from the NASA Space Grant College and Fellowship Program.

About the Journal of Air Transportation

The mission of the *Journal of Air Transportation* (JAT) is to provide the global community immediate key resource information in all areas of air transportation. The goal of the Journal is to be recognized as the preeminent scholarly journal in the aeronautical aspects of transportation. As an international and interdisciplinary journal, the JAT will provide a forum for peer-reviewed articles in all areas of aviation and space transportation research, policy, theory, case study, practice, and issues. While maintaining a broad scope, a focal point of the journal will be in the area of aviation administration and policy.

Development:

The JAT was conceptualized to fulfill an international void of scholarly publications in this area as identified by the primary organizers. It is envisioned that aviation leaders will utilize the JAT as a key decision-making tool. Scholarly rigor and standards will be uncompromised with regular evaluation by the Editorial Board and Panel of Reviewers.

Scope:

The JAT accepts manuscripts on all topics that relate to air transportation, both technical and non-technical. The Panel of Reviewers represents the interdisciplinary nature of air transportation to ensure review by recognized experts. Broad categories of appropriate topics include, but are not limited to:

Aviation Administration: Management, Economics, Policy, Fixed Based Operations, Employment & Internships, Marketing; **Airport Planning, Design & Development:** Capacity & Delay, Small Aircraft Transportation Systems (SATS), Air Transportation Systems - Domestic & International; **Aviation Law:** Air Traffic Control, Regulation Process, Privatization; **Airlines & Cargo:** Logistics, Transport Operations, Air Carrier Training, Low Cost Airlines, Intermodal Transportation; **Education & Training:** Aviation Education, Cognitive Factors & Learning Styles, Instructional Techniques, Distance Learning, Aviation Aerospace Psychology & Safety, Human Factors & Crew Resource Management; **Technology:** Engineering, Aerospace Structures, Propulsion & Performance, Avionics, Geographic Information Systems, Simulation, Electronic Signal Processing, Electronic Markets & Internet, Meteorology & Weather Services; **Future Advancements:** Space Transportation & Flight, General Aviation, Forecasting

Dissemination:

The JAT is catalogued at key research libraries world wide, including the U.S. Library of Congress.* It is indexed in Aviation Tradescan, EBSCO Online, the National Research Council TRIS Index, and ERIC Resources in Education. The JAT is available through inter-library loan at the University of Nebraska at Omaha Library and the Transport and Telecommunications Institute in Latvia via accessing the global OCLC inter-library loan network. A permanent archive is maintained at the University of Nebraska at Omaha. Annual subscriptions are available for $35 for individuals and $68 for institutions. Add $20 for subscriptions outside the U.S.A. Payments may be made by check or purchase order to the UNO Aviation Institute.

---

* The JAT is available on-line at the National Transportation Library at the Bureau of Transportation Statistics, U.S. Department of Transportation.

Panel of Reviewers

Reviewers are appointed by the Editor to represent all elements of aviation and space transportation scholarship and practice. An appointment to the Panel of Reviewers recognizes professional and academic achievement. Appointments are for a three-year term with the option of renewal. For membership consideration, submit a curriculum vita or industry resume to Dr. Brent Bowen, Executive Editor.

Ahmed Abdelghany
United Airlines

Densel Acheson
University of Nebraska at Omaha

Anthony Adamski
Eastern Michigan University

Julio Aguilar
Solvciones en Regulaciones y Mercados, Mexico

Fariba Alamdari
Cranfield University, England

Andreas Antoniou
Commonwealth Secretariat, England

Deak Arch
Ohio University

Herbert Armstrong
College of Aeronautics

Kenneth Barnard
Kansas State University

Jon Bryan
Bridgewater State College

Gerald Chubb
The Ohio State University

David Conway
Southeastern Oklahoma State University

Gerald Cook
Spirit Airlines

Milford Coor
International Aviation Law Consultant

James Crehan
South Dakota State University

Khalid Durani
Karachi, Pakistan

Steve Erb
U.S. Department of Transportation

Jay Evans
National Business Aircraft Association

Mary Fink
NASA Nebraska Space Grant & EPSCoR

E. Terence Foster
University of Nebraska–Lincoln

Terry Gibbs
University of Nebraska at Kearney

Mavis Green
Embry-Riddle Aeronautical University

Allen Hamilton
Federal Express

Fred Hansen
Oklahoma State University

William Herrick
Middle Tennessee State University

Jos Heyman
Tiros Space Information, Australia

John Horine
Central Missouri State University

Matteo Ignaccolo
University of Catania, Italy

Sajjad Jasimuddin
King Abdulaziz University, Saudi Arabia

Randy Johnson
Embry-Riddle Aeronautical University

Alexander Kalmykov
The SABRE Group, Texas

Craig Kanske
Sky Views, Oklahoma

John M. C. King
Aviation & Tourism Management, Australia

Valery Kutev
Transport and Telecommunications Institute, Latvia

Mike Larson
University of Nebraska at Omaha

Thomas Lawton
Imperial College, University of London

TABLE OF CONTENTS

Volume 9, Number 1 – 2004

Articles

The Editors

Brent D. Bowen

Dr. Brent Bowen is Director and Distinguished Professor, Aviation Institute, School of Public Administration, University of Nebraska at Omaha, and the University's Director of Aviation and Transportation Policy and Research. Bowen attained his doctorate in Higher Education and Aviation from Oklahoma State University and a Master of Business Administration degree from Oklahoma City University. His Federal Aviation Administration certifications include Airline Transport Pilot, Certified Flight Instructor (Gold Seal), Advanced Instrument Ground Instructor, Aviation Safety Counselor, and Aerospace Education Counselor. Dr. Bowen's research on the development of the national Airline Quality Rating is regularly featured in numerous national and international media, as well as refereed academic publications. Dr. Bowen has in excess of 300 publications, papers, and program appearances to his credit. His research interests focus on aviation applications of public productivity enhancement and marketing in the areas of service quality evaluation, forecasting, and student recruitment/retention in collegiate aviation programs. He is also well published in areas related to effective teaching and has pioneered new pedagogical techniques. Dr. Bowen has been recognized with awards of achievement and commendation from the American Marketing Association, American Institute of Aeronautics and Astronautics, Federal Aviation Administration, Embry-Riddle Aeronautical University, W. Frank Barton School of Business, Travel and Transportation Research Association, World Aerospace Education Association, and others.

Igor Kabashkin

Dr. Igor Kabashkin is Vice Rector of the Transport and Telecommunications Institute, Latvia, and a Professor in the Aviation Maintenance Department and member of the Technical Committee on Transport of the European Commission for Cooperation in the Field of Scientific and Technical Research. Kabashkin received his Doctor Degree in Aviation from Moscow Civil Engineering Institute, a High Doctor Degree in Aviation from Moscow Aviation Institute, and a Doctor Habilitus Degree in Engineering from Riga Aviation University and Latvian Academy of Science. His research interests include analysis and modeling of complex technical systems, information technology applications, reliability of technical systems, radio and telecommunication systems, and information and quality control systems. Dr. Kabashkin has published over 274 scientific papers, 19 scientific and teaching books, and holds 67 patents and certificates of invention.

Sorenson Best Paper Award

The *Journal of Air Transportation* is proud to present the Sorenson Best Paper Award, named in honor of Dr. Frank E. Sorenson. This award gives recognition to the author(s) with the best literary and scholarly contributions to the field of air transportation. The Editor, on the basis of reviewer rankings during the review process, grants the Sorenson Award. The manuscript with the highest overall score is awarded the Sorenson Best Paper Award. This is considered a high recognition in the aviation community.

Dr. Frank E. Sorenson was a pioneer in the field of aviation education since its early beginnings in the 1940s. A renowned educator and prolific writer, Sorenson contributed not only educational texts to the field, but also served as a consultant and innovator throughout the expanding realm of aviation education and research.

Dr. Sorenson's aviation impact and potential were recognized early on by the National Aeronautics Association when he received the Frank G. Brewer Trophy in 1946 for the most outstanding contribution to the development of youth in the field of education and training. In 1958, the University Aviation Association honored him with the William A. Wheatley Award in recognition of outstanding contributions to aviation education. These were the first of many awards and citations he would earn on a local and national level as he continued his active involvement in the field of aerospace education up until his death in 1977.

Through his involvement with the University of Nebraska–Lincoln Teachers College, Dr. Sorenson generated some of the earliest teaching materials for aviation education and textbooks for military aviators during World War II. Throughout the course of his career, he contributed over forty articles and publications related to the field of aviation education. His efforts guided the way for extensive aerospace research and scholarship from the grassroots to the global level through his participation in Civil Aeronautics Association, the World Congress on Air Age Education, and UNESCO. He has served as chairman of the Air Force Associations Aerospace Council, the Aerospace Education Forum at the First World Congress of Flight, the U.S. Air Force Air Training Command, the Men in Space book series, and NASA's Aerospace Education Advisory Committee. As a result of his

visionary involvement and development of the Link Foundation, the organization has gone on to provide grants now totaling over a half million dollars a year to support and advance aerospace education and training in aeronautics.

Dr. Sorenson's continuous involvement in aviation education and research laid the groundwork for many of the advancements currently taking place in the industry. His ceaseless research and educational outreach demonstrated how one person can make a difference not just today but well into the future.

Currently, several awards exist that are representative of his achievement in aerospace education and research. These include the Frank E. Sorenson Award for Excellence in Aviation Scholarship, representing the highest scholarly honor in aviation education, presented annually by the University Aviation Association; the Frank E. Sorenson Pioneers in Nebraska Aviation Education Award presented annually by the University of Nebraska at Omaha Aviation Institute, as well as a memorial lecture fund and scholarship fund. A maximum of two award plaques will be given per article to the two lead authors in order of submission.

Past Recipients of the

SORENSON BEST PAPER AWARD

2000 Faiba Alamdari and Julian Burrell, *Marketing to Female Business Travelers*, Volume 5, Number 2.

2001 Phillip J. Moore, Henry R. Lehrer, and Ross A. Telfer, *Quality Training and Learning in Aviation: Problems of Alignment*, Volume 6, Number 1.

2001 James C. Taylor and Manoj S. Patankar, *Four Generations of Maintenance Resource Management Programs in the United States: An Analysis of the Past, Present, and Future*, Volume 6, Number 2.

2002 Lawrence F. Cunningham, Clifford E. Young, and Moonkyu Lee. *Cross-Cultural Perspectives of Service Quality and Risk in Air Transportation*, Volume 7, Number 1.

2002 Dale B. Oderman, *Ethics Education in University Aviation Management Programs in the US: Part One—The Need*, Volume 7, Number 3.

2003 Stephen M. Quilty, *Achieving Recognition as a World Class Airport through Education and Training*, Volume 8, Number 1.

2003 Alan J. Stolzer, *Fuel Consumption Modeling of a Transport Category Aircraft: A Flight Operations Quality Assurance (FOQA) Analysis,* Volume 8, Number

Journal of Air Transportation Vol. 9, No. 1 - 2004

Sorenson Best Paper Award Recipient
ARE FOUR-YEAR UNIVERSITIES BETTER THAN TWO-YEAR COLLEGES AT PREPARING STUDENTS TO PASS THE FAA AIRCRAFT MECHANIC CERTIFICATION WRITTEN EXAMINATIONS?

Jeffrey Bruce Summey
Parker Hannifin Corporation
Dublin, Georgia

Marian C. Schultz
The University of West Florida
Pensacola, Florida

James T. Schultz
Embry-Riddle Aeronautical University
Daytona Beach, Florida

ABSTRACT

This study evaluates differences between two-year and four-year schools offering a Federal Aviation Administration (FAA) Part 147 aviation maintenance technician program. The actual average test scores were analyzed to determine whether students from four-year university programs were better prepared for the test than students from two-year college or technical school programs. Test scores can be viewed as a direct indication of the quality of the aviation maintenance programs at these schools. The study found that there was no statistically significant difference in the test scores between two-year college and four-year university students taking the FAA examinations. These results support previous studies that found the learning outcomes of two-year and four-year students on general subjects to be comparable.

Jeffrey Summey received a B.S. in Aeronautics from San Jose State University in 1978, and a Masters of Aeronautical Science from Embry-Riddle Aeronautical University in 2002. He is a FAA licensed aircraft mechanic and flight engineer, and has worked in the aerospace industry for over 20 years. He is currently a senior project engineer with Parker Hannifin Corporation in Dublin, GA, a manufacturer of hydraulic equipment for the aerospace industry.

BACKGROUND

The FAA has established two avenues for an individual to obtain an Airframe and Powerplant (A&P) mechanic certificate. The first avenue is by work experience. Federal Aviation Regulation (FAR) Part 65 describes how an applicant for a mechanic's license must demonstrate between 18 and 30 months of aircraft work experience as a mechanic before being considered experienced enough to take the written examinations. This method is commonly used by military trained mechanics seeking to obtain commercial aircraft mechanic certification. The second avenue is to attend an FAA approved Aviation Maintenance Technician School (Certification, 2002). These schools must meet the requirements of FAR Part 147, which identifies specific requirements for the school facility, equipment, instructors, curriculum and student-to-instructor ratio. Individuals who complete the school curriculum are deemed by the FAA to be qualified to take the written examinations for A&P mechanic certification (Schools, 2002).

FAA approved Aviation Maintenance Technician schools can be found at four-year universities, public community colleges and technical schools, privately operated technical schools, and even some public high schools. While the occupation of aircraft mechanic is often viewed as a blue collar job and the course of instruction better suited for technical colleges more than 20 four-year universities in the United States offer an FAA approved Aviation Maintenance Technician program as part of a Bachelor of Science degree. These four-year degrees are often described as aviation maintenance management, indicating graduates of these programs are prepared to provide technical leadership in the performance of maintenance tasks or to manage the efforts of mechanics (Schools, 2002).

Dr. James Schultz is a tenured Associate Professor of Management at Embry-Riddle Aeronautical University. He has a Bachelors Degree form Michigan State University, a Masters from the University of Oklahoma, and a Doctorate from the University of Southern California. A licensed pilot, retired from the U.S. Air Force after serving tours HQ Strategic Air Command, HQ Air Force Manpower & Personnel Center (AFMPC), and as a Base Commander and Deputy Base Commander. He is the Chair of the Department of General Education at Embry-Riddle Aeronautical University.

Dr. Marian C. Schultz is a tenured Associate Professor of Management/MIS at the University of West Florida. She has a Bachelors Degree from the University of Detroit-Mercy, a Masters from Pepperdine University, and a Doctorate from the University of Southern California. She has served as a consultant for numerous organizations including First City Bank, Pace Foods, Texas Air National Guard, and Hawaii Medical Supplies Corporation. She has presented over 100 papers at regional, national and international conferences.

STATEMENT OF THE PROBLEM

Are four-year universities producing trained aircraft mechanics who are better prepared to provide the technical leadership required for management positions in the aviation maintenance industry than those from two-year technical colleges? The issue of the quality of the instruction and training at four-year universities that offer an FAA approved Aviation Maintenance Technician program is the same concern that the FAA has for every Part 147 school. The FAA requires that Part 147 schools maintain a level of instruction that results in a minimum 70% first-time passing rate on the mechanic written examinations. But given that the FAA mandates the curriculum and instructional goals of a Part 147 school, are mechanics trained at four-year universities achieving higher test scores than those trained at two-year colleges?

Limitations

While the FAA does record the individual test scores students achieve on the three sections of the aircraft mechanic written examination (general, airframe, and powerplant), the FAA only provides the public with the average test scores for all students from each school taking the tests in any given calendar quarter. As such, only average test scores will be used to evaluate the performance of students from four-year and two-year institutions. In addition, the FAA only posts scores for students for the previous eight calendar quarters.

Delimitations

A four-year university offering an aviation maintenance management degree will expose the student to much more management theory than is required in the FAA technician school curriculum. The technical manager will require skills in interpersonal relations, psychology, accounting, and law in addition to an extensive knowledge of aircraft systems. This instruction will better prepare the four-year university graduate for a managerial position. However, for the purpose of this study, only the level of achievement on the FAA aircraft mechanic written examinations will be used as a measure of the aviation maintenance technical knowledge attained by the student.

THE EDUCATION OF AN AIRCRAFT MECHANIC

Students pursuing an aircraft mechanic certificate by attending a FAA approved school are engaged in a demanding course of study. Whether the students attend a four-year university or a two-year technical school, they are required to participate in over 1,900 hours of classroom and laboratory

instruction in 43 subject areas before the FAA will consider them prepared to take the examinations for aircraft mechanic certification. In comparison, a typical four-year college degree of 127 credit hours will require approximately 1,680 hours of classroom instruction. To obtain an A&P mechanic certificate will require the student to pass three written tests, two oral examinations, and two practical tests (O'Brien, 1999).

The FAA regulates the operation and certification of aviation maintenance technician schools. Part 147 of the Federal Aviation Regulations defines the curriculum to be studied, the requirements for instructors, and the types of tools and equipment that must be available to the student. Given that the FAA regulates the methods of instruction in Part 147 schools, it can be expected that students graduating from these schools are uniformly skilled and ready for the aviation workplace. However, there are differences between two-year colleges and four-year universities. These differences may affect the quality of instruction and the student outcome on the aircraft mechanic written examinations (Schools, 2002).

Aviation Maintenance Technician Schools

Approximately 11,000 mechanics enter the aviation industry each year. Over 90% of new A&P mechanics are trained at three main types of institutions (in order): community colleges, vocational/technical schools, and universities. While the demand for mechanics is growing, the number of Part 147 schools has decreased from 220 schools in 1993 to 185 schools in 1999 (McGrath & Waguespack, 1999).

The Aircraft Mechanic Examination as a Program Quality Indicator

The first time passing rate of students taking the aircraft mechanic written examinations is used by the FAA as the primary indicator of program quality. FAR 147.38a addresses the quality of instruction at these schools, and establishes the minimum first time passing rates for schools based on the national passing norm for all students, corrected for the individual school according to the size of the graduating class. This method of evaluating program quality is consistent with current trends in educational accountability. According to higher education literature, focusing more on processes and outcomes will help gain a better perspective on the overall indicators of quality in academic programs (Lindseth, 1999).

The four-year universities in the United States that offer students an opportunity to obtain an A&P mechanic's license are preparing those students for leadership roles in the aviation industry. The curriculum required by the FAA is a thorough and in-depth exposure to a wide spectrum of aircraft maintenance areas. The aircraft mechanic carries a tremendous responsibility when exercising the rights of an A&P license. Aircraft may

not be able to fly if the A&P mechanic cannot solve a problem rapidly, and human life does depend on the judgments and decisions an aircraft mechanic makes.

University aviation programs have the facilities, instructors and resources to produce the best trained aircraft mechanics in the country. Four-year university students come from the upper half of their high school class, and have completed four years of study before taking the FAA examinations. This provides them with two additional years of study over their technical college counterparts.

The FAA aircraft mechanic written examination is an indicator of the quality of the aviation maintenance instruction at any Part 147 certified school. The FAA uses the average student scores for each school to determine if the school is doing an adequate job of training. The average test scores from two-year and four-year institutions would be an accurate measure of the quality of aviation education for each type of school.

STATEMENT OF THE HYPOTHESIS

The hypothesis of this study is that the first-time passing rate and average grade of aviation maintenance students at four-year universities who take the FAA aircraft mechanic written examinations will be significantly different than the first-time passing rate and average grade of students at two-year colleges and technical schools.

The null hypothesis is that the first-time passing rate and average grade of aviation maintenance students at four-year universities who take the FAA aircraft mechanic written examinations will not be significantly different than those of students at two-year colleges and technical schools, as measured at the α=.05 level of significance.

RESEARCH DESIGN

For this study quantitative data, in the form of the average test scores of students from specific schools, were used to evaluate the performance of students from four-year universities and two-year colleges or technical schools taking the FAA aircraft mechanic written examinations. These FAA written examinations are standard across the United States, and test the student in specific areas of aviation maintenance knowledge. Because the tests are standard, an evaluation of the test results should yield an accurate comparison of the two groups of students. The aircraft mechanic written examination is a cognitive test of how well the student has learned the technical areas taught in the Part 147 curriculum.

Population

According to the FAA, there are currently 175 Part 147 certified aviation maintenance technician programs in the United States (Advisory Circular 147-2GG, 2001). Of those, 27 are four-year universities or colleges and 85 are two-year community or technical colleges. The remaining programs are at private maintenance schools and public secondary education schools.

Sample

The sample for this study will be taken from the four-year universities and the two-year community and technical colleges. Programs at private schools and secondary public schools will not be evaluated. All 25 of the four-year universities or colleges, the entire population, will be used to evaluate the test scores of four-year program students. Only 30 of the two-year college or technical schools will be used to evaluate the test scores of two-year program students. These 30 were selected at random from the 85 possible schools.

Sources of Data

The FAA publishes the test scores for each individual aviation maintenance technician school on a quarterly basis. The scores are recorded on FAA Form FS8080-08-147 for the general, airframe and powerplant sections of the test. Examples of the forms are presented in Appendix A.

These forms show the number of students that took the test that quarter, the number that passed, and the average grade. The form also shows the average score of the students in specific segments of the test over the last year, such as how they scored in the basic electrical portion of the general test. The data from FAA Form FS8080-08-147 for the schools selected for evaluation will be compiled to obtain the average test results for each type of program (two-year versus four-year) being evaluated. The scores are available on the FAA website (2000-2002).

Treatment of the Data

The test results from the selected schools were in the form of interval data. The data were recorded on a spreadsheet for each quarter for the previous two years. The test scores for each section of the three tests were also recorded. The data were quantified using the causal-comparative methodology. The independent variable was whether the data is from a four-year or two-year school. The dependant variable is the average test score of the students from that school. The data were evaluated first on the average grades for the overall test. The test results were evaluated using a t-test for

independent samples, at a level of significance of $\alpha = .05$. This revealed whether there was a significant difference between the overall test scores between students from four-year and two-year institutions.

Student performances in the specific areas of the aircraft mechanic examinations were evaluated. This data was in the form of an average score for all students tested over the prior year. The specific areas evaluated on the mechanics examinations are listed in Appendix B. The evaluation revealed whether four-year or two-year schools are significantly better than their counterparts in certain areas of instruction.

RESULTS

The average test scores of the four-year university and two-year college students taking the FAA aircraft mechanic written examinations were evaluated using a t-test. All 27 four-year university and 30 randomly selected two-year colleges were used for this evaluation. The four-year and two-year programs selected are listed in Appendix C. The test scores quantified were for nine calendar quarters, from the first quarter of 2000 to, and including, the first quarter of 2002.

Powerplant Section Test Results

The independent t-test results, at the α=.05 level of significance, for the powerplant section of the aircraft mechanic examination is shown in Table 1.

Based on the results of the t-test, the difference between the test scores of four-year and two-year school students on the powerplant section of the mechanic test was not statistically significant.

Table 1. Overall scores on the powerplant portion of the FAA aircraft mechanic certification written examination of students in selected four-year and two-year aviation maintenance technician programs, 2000-2002

Group	*Four-year schools*	*Two-year schools*
M	87.72	87.53
SD	5.09	5.97
SEM	0.5	0.48
N	105	153

p = .6263
t = .4884 < 1.98 = ns
df = 104

General Section Test Results

The independent t-test results, at the α=.05 level of significance, for the general section of the mechanic test is shown in Table 2.

Based on the results of the t-test, the difference between the test scores of four-year and two-year school students on the general section of the mechanic test was not statistically significant.

Table 2. Overall scores on the general topics portion of the FAA aircraft mechanic certification written examination of students in selected four-year and two-year aviation maintenance technician programs, 2000-2002

Group	*Four-year schools*	*Two-year schools*
M	86.89	87.91
SD	6.57	5.38
SEM	0.6	0.45
N	122	141

p = .0948
t = 1.6836 < 1.98 = ns
df = 121

Table 3. Overall scores on the airframe portion of the FAA aircraft mechanic certification written examination of students in selected four-year and two-year aviation maintenance technician programs, 2000-2002

Group	*Four-year schools*	*Two-year schools*
M	87.51	87.47
SD	5.95	5.25
SEM	0.56	0.45
N	112	137

p = .7956
t = .2597 < 2.000 = ns
df = 111

Airframe Section Test Results

The independent t-test results, at the α=.05 level of significance, for the airframe section of the mechanic test is shown in Table 3.

Based on the results of the t-test, the difference between the test scores of four-year and two-year school students on the airframe section of the mechanic test was not statistically significant.

DISCUSSION

The results of the t-tests for each of the three sections of the FAA aircraft mechanic examinations revealed no statistically significant difference between the test scores of four-year and two-year aviation maintenance students. The first-time passing rate for students taking the examinations was also recorded for this evaluation. However, very few two-year or four-year schools achieved first-time passing rates less than 100% for students taking the FAA tests. A review of the mean and the standard deviation on the tests, for both the four-year and two-year schools, shows that even at three standard deviations below the mean, the student scores are

within one percentage point of the 70% required for passing. As such, the comparison of the first-time passing rates between the two-year and four-year schools would not have added any valuable information to this report.

The FAA Aircraft Mechanic Examination Results

The t-test results for the powerplant section showed nearly identical mean scores between four-year and two-year schools, at 87.92 and 87.53, respectively. The standard deviation for student scores at these schools was also nearly identical, at 5.09 and 5.97.

The t-test results for the general section of the examination showed the highest amount of disparity between four-year and two-year schools, with the two-year schools showing higher mean scores than the four-year schools. The mean for the four-year schools was 86.89, while the two-year schools showed a mean score of 87.91. The standard deviation of the test scores for the four-year schools was 6.57, larger than the 5.38 standard deviation recorded for the two-year schools. This would indicate that some four-year students had more difficulty passing this section of the examinations than did the typical two-year student. But these differences in mean and standard deviation were not statistically significant.

The t-test results for the airframe section of the examination again revealed nearly identical mean values at 87.51 for the four-year schools and 87.47 for the two-year schools. The standard deviation of the test scores for four-year and two-year schools were also nearly identical at 5.95 and 5.25, respectively.

Because of the similarities in the test scores between four-year and two-year aviation maintenance technician school students, a further analysis of the scores for specific areas within the tests would not provide any significant insight into the differences between schools, and so was not attempted.

Explaining the Similarity

There are a number of possible explanations for the lack of difference in the test scores between the two-year and four-year schools. The FAA does have very specific requirements for the curriculum that must be covered by each approved aviation maintenance technician school. This would mean that students at four-year and two-year schools cover the same topics, using similar textbooks and FAA-approved training manuals.

Teaching to the Test

Since the schools are graded by the FAA on their student first-time passing rate for the examinations, schools often conduct their own written tests on their students before certifying the student as having passed the

requirements to take the FAA examinations. This allows instructors to screen out students that may not be ready to achieve a passing score of 70% on the FAA written examinations and identifies specific test areas where these students require extra instruction.

In addition, there are several private publishing companies that offer FAA aircraft mechanic certification examinations guidebooks, which contain hundreds of sample test questions for the student to practice on before taking the actual FAA examinations. These guidebooks are often sold in the college bookstores as a study guide for advanced classes.

Focused Aviation Students

As described by Brady, Stolzer, Muller, and Schaum, the aviation college student is intrinsically motivated to learn. They are more like adults in their learning style, and see aviation education as a career path (2002). For both the four-year and two-year student, obtaining an FAA aircraft mechanic certificate is a major near-term goal along their career path. Achieving this goal can be a tremendous motivating influence when it comes to studying and practicing for the examinations.

Two-Year Schools Hold Their Own

The results of this research project reinforce the findings of Pascarella, Bohr, and Terenzini (1994), in that there does not appear to be a difference in the learning abilities of students who attend two-year institutions versus those who attend four-year institutions. These results also show that there is no difference in program quality between two-year and four-year aviation maintenance technician programs. Despite any perceived advantage four-year universities may have in funding for aviation programs over their two-year college counterparts, two-year technical and community colleges appear to offer the same level of aviation maintenance instruction.

Observations on the Subject Populations

A review of the number of students taking the general section examination showed that 589 four-year students took the exam over the 27-month evaluation period, versus 637 two-year students who took the examination. This results in an average of 21.81 students per four-year university and 21.23 students per two-year college.

One interesting observation noted during this project was the disparity in the number of students taking the FAA examinations within both the four-year and two-year categories. For instance, the University of Alaska at Fairbanks had only 9 students take the examinations in the 27 month period evaluated. San Jose State University had only 11 students take the mechanic examinations. Purdue University had only 13 students taking examinations.

Whereas, Embry-Riddle Aeronautical University had the highest number of four-year students taking the mechanic examinations at 454. Two-year schools, such as Ellis Regional Vocational Technical College, had only 4 students take the examinations during the evaluation period. San Diego Community College had only 9 students take the examinations. Whereas, Tulsa County Area Vocational Technical School had the highest number of two-year students taking the FAA examinations, at 351.

Assuming that an individual student takes all three test sections to obtain an A&P certificate, the number of students obtaining their A&P mechanic certificate from four-year colleges ranged from 3 at the University of Alaska at Fairbanks to 151 at Embry-Riddle Aeronautical University. Using the same assumption for two-year schools, the number of students obtaining their A&P mechanic certificate ranged from 3 at San Diego Community College to 117 at Tulsa County Area Vocational Technical School.

One reason for the disparity in students taking the examinations may be economics. The aviation industry near some schools may eagerly accept partially trained aircraft mechanics without FAA certification. This issue was raised in a Hawaii Community College article (2001), which stated, "The demanding FAA requirements and instructor expectations will always be challenging for the students. Course demands often cause students who gain AERO experience to apply for less skilled (non-certificated) jobs with the airlines prior to completion" (p. 9).

CONCLUSIONS

The hypothesis for this study was that the first-time passing rate and average grade of aviation maintenance technician program students at four-year universities, who take the FAA aircraft mechanic written examinations will be significantly different from that of students at two-year colleges and technical schools. The t-test results for the schools sampled in this study revealed that there was no statistically significant difference in the first-time passing rate, and the average grade, between two-year college and four-year university students taking the FAA aircraft mechanic examinations.

The null hypothesis of this study stated that the first-time passing rate and average grade of aviation maintenance technician program students at four-year universities who take the FAA aircraft mechanic written examinations will not be significantly different from that of students at two-year colleges and technical schools, as measured at the α=.05 level of significance. Based on the t-test results, the null hypothesis was not rejected. There was no significant difference between the first-time passing rate and average grades of two-year college and technical school students, as compared to four-year university students, taking the FAA aircraft mechanic examinations.

The learning outcome of any school that is preparing students to enter the field of aviation maintenance is measured by their students passing all of the FAA aircraft mechanic certification examinations. Because of the need to insure that their students successfully pass the examination, there is a definite need at two-year institutions to control the technician training curricula. This factor may also explain the similarities in the scores between the two-year and four-year institutions.

The certification process is one of the best indicators of the quality of the facilities and instruction at the school. The results of this study clearly show that the aviation maintenance technician programs at two-year colleges and technical schools are comparable to those at four-year universities, as far as the quality of instruction is concerned.

RECOMMENDATIONS

Further study is warranted to determine why there is a wide disparity in the number of students from each school taking the FAA examinations. With the low number of students taking the aircraft mechanic examinations at schools such as Purdue University and San Diego Community College, it would be valuable to know why students are not taking full advantage of the aviation maintenance technician programs available at their schools. In conjunction with this, additional research is needed to determine whether there a connection between the difference in the stated educational goals of two-year and four-year programs and the difference in the number of students from each type of institution taking the examinations.

Another area where further study is warranted is whether the examinations were taken at the same point in the educational experience, that is, taken after two-year of study, regardless of the institution. Additionally, a longitudinal study comparing the career success of students from two-year programs versus those from four-year school programs may show if there is any career advantage in obtaining an A&P mechanic certificate from a four-year university.

REFERENCES

Advisory Circular AC 147-2GG. (2001). FAA certificated aviation maintenance technician schools directory.

Brady, T., Stolzer, A. J., Muller, B., & Schaum, D. (2001). A comparison of the learning styles of aviation and non-aviation college students. *Journal of Aviation/Aerospace Education and Research, 11(3),* 33-44.

Certification: Airmen other than air crew members, 14 C.F.R. § 65. (n.d.). Retrieved April 19, 2002 from http://www.access.gpo.gov/nara/cfr/cfrhtml_00/Title_14/14cfr65_00.html

FAA. (2000-2002). Airmen testing standards: Public norms online reports. Retrieved June 1, 2002 from http://av-info.faa.gov/atssn/

Honolulu community college program health indicators, 2000-2001 program review. (n.d.). Retrieved April 13, 2002, from http://www.hcc.hawaii.edu/hcc_research/ Studies/ phi2000.pdf

Lindseth, P. D. (1999). Assessing the environment and outcomes of four-year aviation programs: Does program quality make a difference? *Collegiate Aviation Review 17(3),* 40-52.

McGrath, R.N. & Waguespack, B. P. (1999). The airline maintenance mechanic educational infrastructure: Supply, demand, and evolving industry structure. *Journal of Aviation/Aerospace Education and Research, 8(3),* 33-43.

O'Brien, B. (1999) I was a potted plant. *AMTonline.* Retrieved April 4, 2002, from http://www.amtonline.com/searchscripts/search.asp?SearchSiteURL=\articles\1998\amt10-98\amt_10-98-9.html

Pascarella, E., Bohr, L., Nora, A., & Terenzini, P. (1994). Cognitive effects of two-year and four-year colleges: Some new evidence. National Center on Postsecondary Teaching, Learning, and Assessment: Chicago, IL. (ERIC Document Reproduction Service No. ED371678).

Schools and other certificated agencies, 14 C.F.R. § 147. (n.d.). Retrieved April 19, 2002 from http://www.access.gpo.gov/nara/cfr/cfrhtml_00/Title_14/ 14cfr147_00.html.

APPENDIX A

EXAMPLES OF FAA FORM FS8080-08-147 USED TO RECORD QUARTERLY AIRCRAFT MECHANIC CERTIFICATION EXAMINATION SCORES OF AN AVIATION MAINTENANCE TECHNICIAN SCHOOL

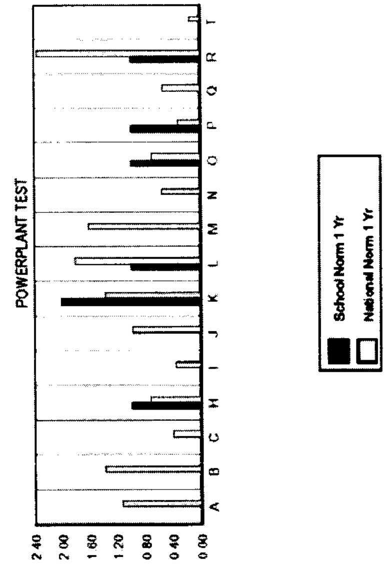
SCHOOL NORMS VS NATIONAL PASSING NORMS — FOR 1 QTR 2000 — FS 8080-08-147 — JAN FEB MAR

SCHOOL CP9T068R — SCHOOL NAME SAN JOSE STATE UNIVERSITY — WESTERN PACIFIC — WP15

CURRENT QUARTER					TWO YEAR ACCUMULATIVE **			
TYPE TEST	NO APPLS	NO APPLS PASS	PCT APPLS PASS	AVG GRADE	APPLS	SCHL NORM	NATL APPLS	NATL NORM
AMP	0	0	0		1	100	5747	96

COMPUTER TEST SCHOOL NORM VS NATIONAL NORM

	A Recip Eng	B Turb Eng	C Eng Insp	H Eng Inst	I Fire Prot	J Eng Elect	K Lub Sys	L Ign Sys	M Fuel Meter	N Fuel Sys	O Induct Sys	P Cool Sys	Q Exhst Sys	R Prop	T APU
SCHOOL NORM 1 YR	0.00	0.00	0.00	1.00	0.00	0.00	2.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00	0.00
NATIONAL NORM 1 YR	1.13	1.39	0.40	0.73	0.36	0.99	1.38	1.81	1.62	0.56	0.71	0.30	0.54	2.36	0.15



SCHOOL NORM VS NATIONAL NORM - 1 YR

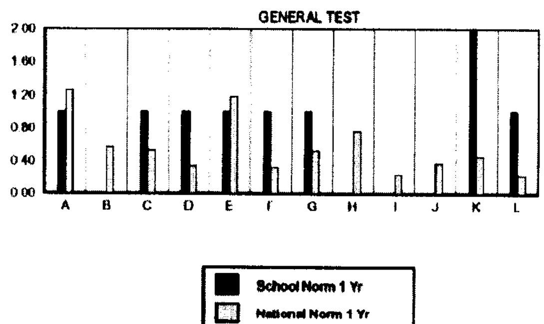
** CURRENT DB EFF DATE 10/1996

SCHOOL NORMS VS NATIONAL PASSING NORMS   FOR 1 QTR 2002   FS 3000-08-147   JAN FEB MAR
SCHOOL OP9T068R   SCHOOL NAME SAN JOSE STATE UNIVERSITY   WESTERN PACIFIC   WP15

CURRENT QUARTER					TWO YEAR ACCUMULATIVE **			
TYPE TEST	NO APPLS	NO APPLS PASS	PCT APPLS PASS	AVG GRADE	APPLS	SCHL NORM	NATL APPLS	NATL NORM
AMG	0	0	0		4	100	5792	96

COMPUTER TEST SCHOOL NORM VS NATIONAL NORM

	A	B	C	D	E	F	G	H	I	J	K	L
	Basic Elect	A/C Dwg	Wt & Bal	Fluid Lines	Mat'l & Proc	Gnd Op & Serv	Clean & Corros	Math	Maint Forms	Basic Phy	Maint Pub	Aml Priv
SCHOOL NORM 1 YR	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	2.00	1.00
NATIONAL NORM 1 YR	1.26	0.57	0.53	0.35	1.19	0.33	0.52	0.76	0.24	0.38	0.45	0.23



SCHOOL NORM VS NATIONAL NORM - 1 YEAR

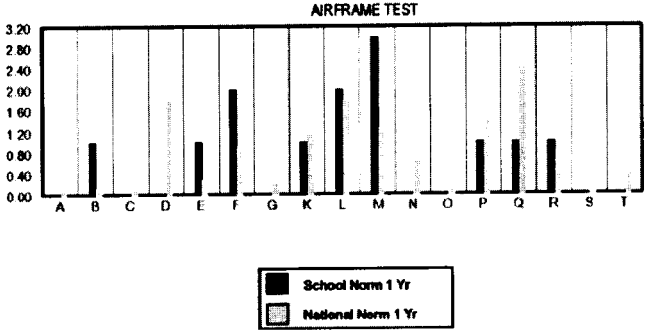
** CURRENT DB EFF 01 OCT 1998

SCHOOL NORMS VS NATIONAL PASSING NORMS — FOR 1 QTR 2000 — FS 8080-08-147 — JAN FEB MAR
SCHOOL OP9T088R SCHOOL NAME SAN JOSE STATE UNIVERSITY — WESTERN PACIFIC — WP15

CURRENT QUARTER					TWO YEAR ACCUMULATIVE **			
TYPE TEST	NO APPLS	NO APPLS PASS	PCT APPLS PASS	AVG GRADE	APPLS	SCHL NORM	NATL APPLS	NATL NORM
AMA	0	0	0		2	100	5604	95

COMPUTER TEST SCHOOL NORM VS NATIONAL NORM

	A Wood Struct	B A/C Cover	C A/C Finish	D Sheet Metal	E Weld	F Assy & Rig	G Airfm Insp	K Lndg Gear	L Hyd Fnc	M Cabin Atmos	N Inst Sys	O Com Nav	P Fuel Sys	Q Elect Sys	R Pos Warn	S Ice/ Rain	T Fire Prot
SCHOOL NORM 1 YR	0.00	1.00	0.00	0.00	1.00	2.00	0.00	1.00	2.00	3.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00
NATIONAL NORM 1 YR	0.07	0.13	0.06	1.79	0.30	0.94	0.19	1.12	1.76	1.26	0.65	0.54	1.46	2.41	0.60	0.39	0.36



SCHOOL NORM VS NATIONAL NORM - 1 YEAR

** CURRENT DB EFF DT OCT 1998

APPENDIX B

FAA AIRCRAFT MECHANIC CERTIFICATION TEST AREAS

Area	*General Test*	*Airframe Test (AMA)*	*Powerplant Test (AMP)*
A	Basic Electricity	Wood Structures	Reciprocating Engines
B	Aircraft Drawings	Aircraft Coverings	Turbine Engines
C	Weight & Balance	Aircraft Finishes	Engine Inspection
D	Fluid Lines	Sheet Metal	
E	Materials & Processes	Welding	
F	Ground Operations	Assembly & Rigging	
G	Cleaning & Corrosion	Airframe Inspection	
H	Math		Engine Instruments
I	Maintenance Forms		Fire Protection
J	Basic Physics		Engine Electronics
K	Maintenance Pubs	Landing Gears	Lubrication Systems
L	AMT Privileges	Hydraulics/Pneu	Ignition Systems
M		Cabin Atmosphere	Fuel Metering
N		Instrument Systems	Fuel Systems
O		Comm/Nav	Induction Systems
P		Fuel Systems	Cooling Systems
Q		Electrical Systems	Exhaust Systems
R		Position/Warning	Propellers
S		Ice & Rain	
T		Fire Protection	Auxiliary Power

APPENDIX C

UNIVERSITIES AND COLLEGE WITH AN AVIATION MAINTENANCE TECHNICIAN PROGRAM INCLUDED IN THE EVALUATION

Four-year Universities	*Two-year Universities*
University of Alaska at Fairbanks	Western Nebraska Community College
University of Alaska at Anchorage	Community College District # 522, Illinois
Southern Arkansas University	College of Alameda, California
Clayton State College, Georgia	New Hampshire Community Technical College
University of the District of Columbia	Lake Area Technical Institute, South Dakota
Embry-Riddle Aeronautical University, Florida	Northland Community College, Minnesota
Idaho State University	City College of San Francisco, California
Lewis University, Illinois	Minneapolis Community and Technical College
Letrourneau University, Texas	Hawkeye Community College, Iowa
Southern Illinois University	Everett Community College, Washington
Purdue University, Indiana	Shasta College, California
Vincennes University at Indianapolis, Indiana	Columbus State Community College, Ohio
Vincennes University at Vincennes, Indiana	North Valley Occupational Center, California
Kansas State University	San Diego Community College, California
Southern University, Louisiana	Middle Georgia Technical Institute
Andrews University, Michigan	St. Philips College, Texas
Northern Michigan University	Mt. San Antonio College, California
Western Michigan University	Piedmont Baptist College, North Carolina
Minnesota State University	Reedley College, California
Utah State University	Tulsa County Area Vocational Technical School, Oklahoma
Hampton University, Virginia	Clover Park technical College, Washington
Central Missouri State University	Lansing Community College, Michigan
Bob Jones University, South Carolina	Heart of Georgia Technical College
St. Louis University Parks College, Missouri	Glendale Community College, California
San Jose State University, California	Wayne County Community College, North Carolina
Eastern New Mexico University	Chandler-Gilbert Community College, Arizona
Penn College of Technology, Pennsylvania	College of San Mateo, California
	San Joaquin Valley College, California
	Ellis Regional Vocational Technical College, Connecticut
	Wallace Community College, Alabama

Journal of Air Transportation Vol. 9, No. 1 - 2004

ASSESSING PERCEIVED RISK OF CONSUMERS IN INTERNET AIRLINE RESERVATIONS SERVICES

Dr. Lawrence F. Cunningham
University of Colorado at Denver
Denver, Colorado

Dr. James Gerlach
University of Colorado at Denver
Denver, Colorado

Dr. Michael D. Harper
University of Colorado at Denver
Denver, Colorado

ABSTRACT

This research investigates the premise that the use of Internet airline reservation systems is perceived to be riskier than traditional airline reservation systems. Unlike previous studies on perceived risk that typically focused on the relationship of perceived risk and information search, this study examines the dynamics of perceived risk throughout the various stages of the consumer buying process. A survey of 159 respondents reveals that perceived risk for both traditional and Internet airline reservation services follows a systematic pattern throughout the consumer buying process. Perceived risk for both traditional and Internet airline reservation systems falls during information search but recovers and rapidly increases as consumers approach the moment of purchase. When viewed as a dynamic process, perceived risk for Internet airline reservation services shows more radical changes in risk levels than the traditional service. Another major finding of this study is the discovery of a risk premium for Internet airline reservation services that permeates all stages of the consumer buying process.

Lawrence F. Cunningham is a Professor of Marketing at the Business School at the University of Colorado at Denver where he teaches graduate courses in services and international marketing. Professor Cunningham research interests are in the areas of services marketing with particular interest in the classification of services, the perceived risks of services and airline service. He has published in Journal of Marketing Theory and Practice, Journal of Services Marketing, Transportation Journal, Advances in Services Marketing. He holds an M.S. from Northwestern University, an MBA and DBA from the University of Tennessee.

INTRODUCTION

Online airline ticket sales reached approximately $14.2 billion in 2002 (Foss, 2003). Travel business on the Internet accounts for about 15% of overall travel sales; about one-half of that is spent on airline ticket sales. Although Internet-based airline reservation services has been one of the fastest growing Internet services, researchers have suggested that even faster growth is precluded because of barriers such as perceived risk (Cases, 2002; Forsythe & Shi, 2003; Jarvenpaa & Todd, 1997; Liebermann & Stashevsky, 2002; Lim, 2003; Tan, 1999; Vijayasarathy & Jones, 2000). By examining barriers such as perceived risk in the context of one of the fastest growing Internet services, researchers may determine whether there is a need to develop expensive mitigation strategies that lower perceived risk and spur growth.

This research reports on a survey of consumers that compares and contrasts their awareness of perceived risk when making airline reservations over the Internet as opposed to making reservations traditionally. Specifically, the study addresses the following key questions:

1. Do consumers experience a higher level of perceived risk when they shop over the Internet than when they shop traditionally? At what stages of the consumer buying process do differences occur?
2. Does perceived risk follow a systematic pattern as the Internet customer progresses through the consumer buying process? Do traditional shoppers experience similar fluctuations in perceived risk?
3. If an Internet risk premium exists, does it also follow the same pattern?

James H. Gerlach is professor of information systems at the University of Colorado at Denver. His research interests include e-commerce and management of information systems technology. Gerlach holds a MS in computer science and a PhD in management, both from Purdue University. He is a member of the IEEE and the ACM. His work appears in such notable journals as *Management Information Systems Quarterly*, *IEEE Software*, *Communications of the ACM*, and *The Accounting Review*.

Michael D. Harper is a senior instructor of quantitative methods in the Business School at the University of Colorado at Denver. After receiving a B.S. in geophysical engineering from Colorado School of Mines, M.S. in mathematics from University of Tulsa, M.S. in operations research and statistics, and a Ph.D. in operations research and statistics from Rensselaer Polytechnic Institute, he worked in research at Los Alamos Scientific Laboratory, in business as a consultant in the oil industry, and in university teaching. He has published in government research publications and technical journals.

THEORETICAL FOUNDATIONS

Perceived Risk and the Consumer Buying Process

Consumer perceptions of risk have been widely dealt with in the past literature and have been shown to shape all purchase decisions to varying degrees, and thereby influence consumer behavior (e.g., Bauer, 1960; Bettman, 1973; Chaudhuri, 1997; Cox, 1967; Cunningham, 1967; Mitchell, 1992; 1999). A purchase decision involves risk when the consequences connected with the decision are uncertain and some results are more desirable than others (Kogan & Wallach, 1964; 1967; Pollatsek & Tversky, 1970; Rapoport & Wallsten, 1972; MacCrimmon & Wehrung, 1986). A situation where the only possible result is a sure loss of some magnitude is not risk, since there is no variance among the possible results. Kogan and Wallach (1964) describe the concept of risk as having two dimensions: (a) the chance aspect where the focus is on probability, and (b) the danger aspect where the emphasis is on severity of negative consequence. Although many refinements to the definition of risk have been proposed, including expected value theory (Cunningham, 1967) and expected utility theory (Bonoma & Johnston, 1979; Currim & Sarin, 1983; Hauser & Urban, 1979), risk remains a subjectively determined expectation of loss by the consumer (Stone & Winter, 1987); thus the term, perceived risk.

It is theorized that when perceived risk falls below an individual's acceptance value, it has little effect on intended behavior and is essentially ignored (Greatorex & Mitchell 1993). On the other hand, an extremely high level of perceived risk can cause a consumer to postpone or avoid a purchase entirely. The extent of the exposure depends on the importance or magnitude of the goal, the seriousness of the penalty for not attaining the goal, and the amount of means committed to achieving the goal (Cox, 1967; Dowling & Staelin, 1994). Perceived risk is usually measured as a multidimensional construct: physical loss, financial loss, psychological loss, time loss, performance risk, and social risk (Roselius, 1971, Jacoby & Kaplan, 1972).

Generally, perceived risk is conceptualized as a typical influence that is addressed during the early stages of the consumer buying process (e.g., Cox, 1967; Dowling & Staelin, 1994; Murray, 1991; Murray and Schlacter, 1990; Zeithaml & Bitner, 2003). The consumer buying process is often described as a five-stage linear process (Blackwell, Miniard & Engel, 2003; Hawkins, Coney, Best & Hawkins, 2003): stage one -- need recognition, stage two -- information search, stage three -- alternatives evaluation, stage four -- purchase decision, and stage five -- post-purchase behavior. In the need recognition stage, consumers first perceive risk when they recognize the need for a product or service. In the presence of uncomfortable levels of perceived risk, consumers apply risk reduction strategies during the second

and third stages, such as reliance on personal recommendations (Cunningham, 1967; Midgley, 1983; Perry & Hamm, 1969), seeking additional information about a product or service (Beatty & Smith, 1987; Cox, 1967; Lutz & Reilly, 1973), a preference for national brands (Bauer, 1960; Locander & Herman, 1979; Lutz & Reilly, 1973), and the security of warranties (Bettman, 1973; Cox, 1967; Dowling & Staelin, 1994). It is generally assumed that these practices are sufficient for mitigating risk, and risk is seldom studied beyond the information search stage.

Although the impact of perceived risk on the consumer buying process for services is less studied than for products, the effect of perceived risk is believed to have a greater effect on the consumer for services (Guseman, 1981; Murray, 1991; Murray & Schlacter, 1990). Services are generally intangible, non-standardized, usually sold without guarantees, and often need to be experienced before they can be assessed (Parasuraman, Zeithaml & Berry, 1985; Zeithaml & Bitner, 2003). Consumers find themselves trying to evaluate virtually indistinguishable service alternatives and providers. These characteristics make services more difficult to evaluate than goods. As a result, service purchasers rely less on brand loyalty (Mitra, Reiss & Capella, 1999) and more heavily upon personal information sources and recommendations during the pre-purchase interval (Murray, 1991; Murray and Schlacter, 1990).

Like most services, airline services are intangible, somewhat standardized, heavily dependent upon human performance, and often sold with limited guarantees. While consumers may anticipate an airline experience because of prior experience, each airline experience varies and carries risk. Although airline reservation usage is amongst the heaviest of all Internet product and service categories, there is no research evidence that evaluates the role of perceived risk in the consumer buying process.

Perceived Risk and E-Commerce

The majority of research on perceived risk is focused on traditional purchasing situations. However, Internet shopping is much different than shopping in stores. Internet shopping technologies are essentially self-service technologies that offer the benefits of round-the-clock convenience, ubiquitous availability, time and money savings, and a reduction in the anxiety caused by judgmental service representatives (Bitner, 2001; Meuter, Ostorm, Roundtree & Bitner, 2000). Of course, there are disadvantages to Internet shopping such as system complications, computer phobia, and loss of pleasure and social interaction (George, 1987). As a self-service technology, Internet airline reservation places a significant burden and responsibility on the consumer. The consumer is responsible for searching multiple carriers for fares, comparing prices, and proper booking. Mistakes

are the sole blame of the consumer who has very limited recourse for correcting errors. Of course, similar concerns are applicable to a wide range of Internet services and shopping situations, and are not limited to airline reservations.

Although Internet airline reservations have not been studied specifically, Internet shopping has been studied generally. Researchers (Vijayasarathy & Jones, 2000) found perceived risk to be a significant factor affecting Internet consumer behavior. Liebermann and Stashevsky (2002) and Fosythe and Shi (2003) provide evidence to support a relationship between perceived risk and frequency of use. Fosythe and Shi contend that perceived risk is likely to have the greatest impact on infrequent Internet shoppers, which precludes the conversion of Internet browsers into Internet shoppers.

These researchers (Vijayasarathy & Jones, 2000; Liebermann & Stashevsky, 2002; Fosythe & Shi, 2003) present a substantial argument for including perceived risk as a factor influencing Internet shopping behavior and usage. This raises the question of whether perceived risk has an influence beyond information search. The present authors suggest further exploration of the influence of perceived risk at all stages of the consumer buying process.

Research Model and Research Questions

The authors suggest, based on the literature review, that two major factors influence perceived risk: shopping method (i.e., traditional versus Internet) and consumer buying stage (i.e., problem recognition, information search, evaluation of alternatives, purchase and post-purchase). The first factor, shopping method, encapsulates all properties related to the design of the shopping method, including physical characteristics and the business models underlying the application. The second factor is the relationship between perceived risk and consumer buying stages, which is unexplored at the latter stages in the extant literature. Based on this research model, the following questions are pursued in this study:

Question 1: Does an Internet perceived risk premium exist at each consumer buying stage for airline reservation services?

Question 1 is based on the supposition that Internet airline reservation services are perceived to be riskier than traditional airline reservation services. The Internet perceived risk premium is measured as the difference in perceived risk between the two shopping methods: Internet and traditional. It reflects the incremental risk to the consumer of using Internet airline reservation services over traditional services.

While question one tests for an Internet risk premium at each and every stage of the consumer buying process, question two investigates whether the

premium holds constant across stages. The second question is based on the belief that perceived risk is not fixed and varies throughout the consumer buying process. If perceived risk holds constant, it displays a horizontal line. However, if perceived risk varies, it displays a systematic pattern that shows that the level of perceived risk varies by stage of the consumer buying process. The second question examines Internet airline reservation services and traditional services respectively, as well as the Internet risk premium.

Question 2: Does a systematic pattern of perceived risk exist for traditional and Internet airline reservation services? Does the Internet risk premium follow a systematic pattern as well?

The third question inspects the shape of the systematic patterns of perceived risk by identifying those stages of the consumer buying process that give rise to the differences in perceived risk; the focus is on identifying the stages that would bring about significant changes in risk perceptions. Question 3 examines the perceived risk for Internet airline reservation services, traditional airline reservation services, and the Internet risk premium for fluctuations between stages. If this question is answered in the affirmative for the Internet risk premium, then perceived risk fluctuates differently for Internet airline reservation services than for traditional airline services. The question is based on the supposition that the effect of the Internet on perceived risk is magnified, reflecting the possible occurrence of additional risk factors or greater risk emphases for Internet consumers that are not shared by consumers of traditional services.

Question 3: Does perceived risk vary between adjacent stages for Internet airline reservation services, traditional airline reservation services, and the Internet risk premium?

Research Design and Methods

An initial survey instrument was developed that gave respondents definitions of the five stages of the consumer buying process. Initial pre-tests of that instrument were promising and led to further refinements. The final instrument (see Appendix A) collected data on perceived risk for Internet airline reservation services and traditional airline reservation services from undergraduate and graduate student respondents at a major metropolitan university. For each service, respondents were asked for levels of perceived risk at each stage. Respondents were asked to identify overall levels of risk and assess the severity of risk by stage for each service. In all cases, perceived risk was measured using a 7-point Likert scale. These data were used for evaluating the exploratory questions previously mentioned. Although there has been a concern regarding the use of students as surrogate

consumers, they were deemed appropriate for this study because they were actual, not surrogate, customers of the services selected: 72% of the respondents indicated that they had used traditional airline reservation services, 89% had used Internet airline reservation services, and 62% used both services. The large number of respondents that used both shopping methods suggests the respondent pool reflects a group that is informed about both alternatives.

The final instrument was completed by 159 volunteer undergraduate and graduate business school students at the same major urban university with a response rate of 99%. Care was taken not to include respondents who had completed the pretest. The respondents were nearly evenly split between genders (79 males, 80 females), the average age was 26 years, and there were 103 undergraduates and 56 graduates. Almost all respondents were employed at least halftime, 112 fulltime. The mean household income was $62,000 and 97 respondents were single.

DATA ANALYSIS AND RESULTS

The descriptive statistics (see Figure 1) illustrate the patterns of responses received from the subjects. The plots show the average perceived risk by consumer buying stage for Internet airline reservation services and for traditional airline services. The differences between the Internet and traditional points are plotted as the Internet perceived risk premium. Visual inspection suggests that the Internet service is perceived to be riskier than the traditional service and that perceived risk fluctuates significantly throughout the consumer buying process. The results of the statistical analyses follow.

To address the first question, a paired-difference t-test was performed to determine if the averages of the Internet data were significantly different from the averages of the traditional data at each stage. Table 1 presents the results showing that the averages are significantly different ($p < .001$ for stages one, four, and five; $p < .01$ for stage three; $p < .05$ for stage two). This statistical testing demonstrates the existence of an Internet perceived risk premium at each stage.

The second question investigates the pattern of perceived risk as the consumer progresses through the consumer buying stages. Two-way ANOVAs were performed to test the difference of averages between respondents and the difference of averages between stages for the Internet, the traditional, and the Internet risk premium data. Table 2 summarizes the results of the three ANOVAs. The ANOVAs results show a significant difference between respondents ($p < 0.001$) for all three tests, which indicate that the respondents introduce systematic variability. The ANOVAs for Internet services, traditional services, and the Internet risk premium data show that stages are also significant ($p < 0.001$). That means the level of risk

perceived does not hold constant across stages. Hence the perceived risk for traditional and Internet airline services display a systematic pattern over the consumer buying process. If the patterns are the same, the Internet risk premium would be constant. The ANOVA for the Internet risk premium reveals that the premium is not constant and hence the systematic pattern of Internet perceived risk is different from that of traditional services.

Figure 1. Patterns of Perceived Risk by Consumer Buying Stage for Internet Airline Reservation Services, Traditional Airline Reservation Services and the Internet Risk Premium, 2004

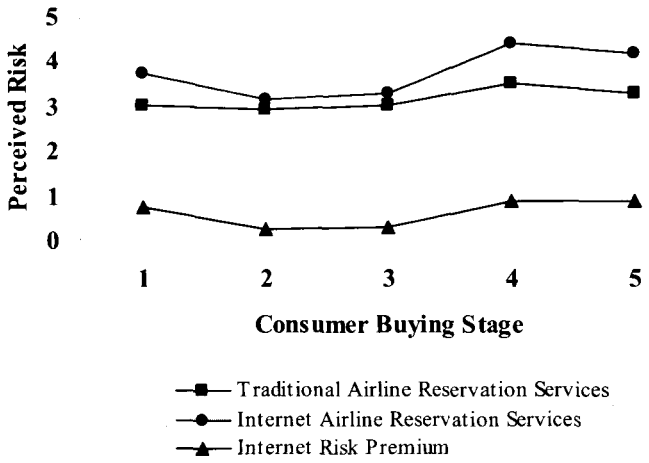


Table 1. Standard Deviations between Internet Airline Reservation Services, Traditional Airline Reservation Services, and the Internet Risk Premium for each Consumer Buying Stage, 2004

	Airline	
Stage 1	0.72 (1.46)***	n = 152
Stage 2	0.21 (1.40)*	n = 147
Stage 3	0.26 (1.33)**	n = 145
Stage 4	0.87 (1.59)***	n = 150
Stage 5	0.87 (1.42)***	n = 151

* significant at p = .05
** significant at p = .01
*** significant at p = .001

Table 2. Significance of Consumer Buying Stages on Perceived Risk of Internet Airline Reservation Services. Traditional Airline Reservation Services and the Internet Risk Premium, 2004

	Airline								
	Internet			*Traditional*			*Internet Risk Premium*		
Source	DF	MS	F	DF	MS	F	DF	MS	F
Respondents	111	10.63	6.22***	111	8.28	6.12***	111	5.02	4.23***
Stages	4	34.55	20.20***	4	9.52	7.04***	4	9.11	7.68***
Error	444	1.71		444	1.35		11	1.19	

*** *significant at p = .001*

The third question concerns the identification of those adjacent stages where perceived risk changes significantly. From the two-way ANOVAs, Fisher's least significant difference tests were performed on adjacent stages for both services and the Internet risk premium. Table 3 presents the statistical results of these tests.

For Internet services, statistically significant changes are observed in the averages between stages one and two ($p < .05$), and stages three and four ($p < .001$). A significant decrease in perceived risk occurs between stages one and two, and a significant increase occurs between stages three and four. For traditional services, a statistically significant increase occurs between stages three and four ($p < .001$), and a statistically significant decrease occurs between stages four and five ($p < .05$). Rapid changes in perceived risk occur at information search and purchase for Internet airline reservation services, while the changes in perceived risk occur at the purchase and post purchase stages for traditional airline reservation services.

When comparing Internet and traditional services using the Internet risk premium data, a statistically significant decrease occurs at stages one to two ($p < .05$) and an increase at stages three to four ($p < .001$). The implication is that the Internet changes the fluctuations in the pattern of perceived risk for airline reservations at these transition points. The implication is that information search is more effective at reducing perceived risk levels for Internet shoppers. However, Internet shoppers at the time of purchase experience higher levels of perceived risk than buyers using traditional methods.

SUMMARY OF FINDINGS

Descriptive statistics on the level of perceived risk at each stage of the consumer buying process for Internet airline reservation services and traditional airline reservation services, as well as differences in perceived risk between the two shopping methods are presented. Statistical analysis of this data was used to address three major research questions. The first research question concerns the existence of an Internet risk premium.

Statistical analysis supports the premise that the Internet method of shopping introduces additional perceived risk at each stage of the consumer buying process, as shown in Figure 1. The analysis indicates that there is a risk premium for Internet airline reservation services at every stage of the consumer buying process.

Table 3. Significant Differences for Adjacent Stages of Consumer Buying Stages for Internet Airline Reservation Services, Traditional Airline Reservation Services and the Internet Risk Premium, 2004

	Adjacent Stages	*Airline*
Internet		
	1 to 2	0.50*
	2 to 3	0.08
	3 to 4	1.19**
	4 to 5	0.28
Traditional		
	1 to 3	0.14
	2 to 3	0.05
	3 to 4	0.65***
	4 to 5	0.31
Internet Risk Premium		
	1 to 2	0.36
	2 to 3	0.03
	3 to 4	0.54***
	4 to 5	0.04

* significant at p = .05
** significant at p = .01
*** significant at p = .001

Further analysis indicates that there is systematic fluctuation of perceived risk across the stages of the consumer buying process for both Internet and traditional airline reservation services, as well as for the Internet risk premium. Hence, the second research question is answered affirmatively for all three cases – perceived risk does follow a systematic pattern. The analysis for the third research question indicates that perceived risk for Internet airline reservation services decreases as the user progresses to information search (stage two) and increases as the buyer moves from alternative evaluation (stage three) to purchase (stage four). The pattern for traditional airline reservation services is both similar and distinct from Internet services. Between evaluation of alternatives and purchase, an increase in perceived risk occurs, followed by a decrease between purchase and post-purchase. The Internet risk premium highlights the dissimilarities between risk perceptions for Internet and traditional airline reservation services. It fluctuates between stages one and two and stages three to four. In summary, the data shows that the rate of change in perceived risk is greater for Internet shoppers transitioning from need recognition to information search and from alternative evaluation to purchase decision.

DISCUSSION AND CONCLUSIONS

Researchers have typically assumed that perceived risk principally occurs at the need recognition stage during the consumer buying process (Zeithaml & Bitner, 2003). They understood that an information search would alleviate that risk and allow the purchase process to continue. Risk has been discussed infrequently in conjunction with the other stages of the consumer buying process. Now, however, statistical evidence from this study of airline reservation services demonstrates that perceived risk occurs at each stage of the consumer buying process, regardless of shopping method.

These statistical findings indicate that perceived risk follows a systematic pattern for Internet and traditional airline reservation services. Generally, perceived risk falls dramatically at the information search stage for Internet services, but then rises dramatically from the alternatives evaluation stage to the purchase stage. Perceived risk for traditional airline reservation services generally follows a similar pattern except that risk does not decrease between need recognition and information search, but does increase between evaluation of alternatives and purchase. Risk then falls at the post-purchase stage.

Perceived risk for Internet airline reservation services falls more rapidly than for traditional airline reservation services during need recognition and information search and accelerates more quickly between the alternatives evaluation and purchase stages. Most importantly, perceived risk appears to play a prominent role during the actual purchase of a service regardless of shopping method. Since perceived risk intensifies at the moment of purchase, this phenomenon warrants further investigation and research.

It was shown that an Internet perceived risk premium occurs at each stage of the consumer buying process for airline reservation services. Statistical analysis reveals that the Internet perceived risk pattern is consistently elevated when compared to the same pattern of a traditional service. This risk premium alters the shape of the perceived risk pattern and reflects the volatility of risk perceptions related to shopping method and stage. The pattern reveals more radical changes in perceived risk levels for Internet services than for traditional services at information search and purchase stages.

The traditional concept of perceived risk suggests that risk is mitigated by information search and continues at reduced, if not insignificant, levels for the remainder of the process. Based on this work, the present authors suggest perceived risk, while alleviated by an information search, may again intensify at the purchase stage of the consumer buying process and remains elevated through the post-purchase stage. Hence, perceived risk may be of continuing research importance, not only because of the evolution of

shopping methods, but because it is, in reality, a dynamic concept in the context of the consumer buying process.

There are a number of managerial implications associated with this research. First, Internet shoppers experience a heightened level of perceived risk at the need recognition stage. Perceived risk falls during the transition from problem recognition to information search for Internet shoppers – suggesting that information search is partly successful at alleviating risk, but not entirely since the Internet risk premium endures. The initial heightened level of risk is likely a barrier to using Internet airline reservation services. Risk mitigation strategies for dealing with initial risk levels may include providing information on the advantages of online reservation systems, user-friendly system design, special help and handholding for consumers, and guarantees of satisfaction.

Regardless of shopping method, airline reservation purchase is characterized by rapidly accelerating risk as the buyer moves from information search to purchase. Consumers purchasing airline reservation services, and perhaps other services, experience feelings of risk. Under such circumstances, the challenge to providers of airline reservations is to determine the cause of this risk acceleration. One possible explanation is that some issues remain unresolved for the consumer as the purchase process reaches culmination. For example, the consumer may consider the possibility of double booking, poor seating choices, failure to obtain electronic receipts or timely delivery of ticket, or paying too much for a non-transferable, non-refundable ticket. When operating computer systems, it is normal for users to make unintentional mistakes. For self-service technologies management's role is to provide a non-punitive environment for the consumer. Management has to provide immediate recourse to rectify consumer mistakes.

Finally, there is clearly a premium for Internet shopping for airline reservations. It seems that the challenge to develop risk mitigation strategies is more urgent for providers of this service. However, providers need to establish whether the incremental risk does indeed affect patronage. Providers need to understand the inherent risks of Internet services and how those risk perceptions may ultimately limit the utility of Internet delivered services.

REFERENCES

Bauer, R. A. (1960). Consumer behavior as risk taking. In R. S. Hancock (Ed.), Dynamic marketing for a changing world. (pp. 389-98). *Proceedings of the 43rd Conference.* Chicago, IL: American Marketing Association.

Beatty, S. E. & Smith, S. M. (1987). External search effort: an investigation across several product categories. *Journal of Consumer Research, 14,* 83-95.

Bettman, J. R. (1973). Perceived risk and its components. *Journal of Marketing Research,10,* 84-90.

Bitner, M. J. (2001). Self-service technologies: What do customers expect? *Marketing Management (Spring),* 10-11.

Blackwell, R. D., Miniard, P. W. & Engel, J. F. (2003). *Consumer behavior.* Orlando, FL: Harcourt.

Bonoma, T. V. & W. J. Johnston. (1979). Decision making under uncertainty: a direct measurement approach. *Journal of Consumer Research, 6,* 177-91.

Cases, A-S. (2002). Perceived risk and risk-reduction strategies in Internet shopping. International Review of Retail, *Distribution and Consumer Research, 12(4),* 375-94.

Chaudhuri, A. (1997). Consumption emotion and perceived risk: A macro-analytic approach. *Journal of Business Research, 39,* 81-92.

Cox, D. (1967). *Risk taking and information handling in consumer behavior,* Boston, MA: Harvard University.

Cunningham, S. M. (1967). Perceived risk and brand loyalty. In D. F. Cox (Ed.). *Risk-Taking and Information Handling in Consumer Behavior.* (pp. 507-23). Boston, MA: Boston University Press.

Currim, I. S. & R. K. Sarin (1983). A procedure for measuring and estimating consumer preferences under uncertainty. *Journal of Marketing Research, 20,* 249-56.

Dowling, G. R. & R. Staelin (1994). A model of perceived risk and intended risk-handling activity. *Journal of Consumer Research, 2,* 119-34.

Forsythe, S. & B. Shi (2003). Consumer patronage and risk perceptions in Internet shopping. *Journal of Business Research,* 56, 867-75.

Foss, B. (2003). *Online discounter to offer travel deals.* Associated Press, Oct. 14.

George, R. J. (1987). In-home electronic shopping: Disappointing past, uncertain future. *Journal of Consumer Marketing, 4(4),* 47-56.

Greatorex, M. & V-W. Mitchell (1993). Developing the perceived risk concept: Emerging issues in marketing. (pp. 405-415). In M. Davies, et al. (Eds.). *Proceedings, Marketing Education Group Conference.* Loughborough.

Guseman, D. S. (1981). Risk perception and risk reduction in consumer services. In J.H. Donnelly, et al. (Eds.). *Marketing of Services,* Chicago, IL: American Marketing Association.

Hauser, J. R. & G. L. Urban (1979). Assessment of attribute importance and consumer utility functions: Von Neumann-Morgenstern theory applied to consumer behavior. *Journal of Consumer Research, 5(4),* 251-262.

Hawkins, D. I., Coney, K. A., Best, R. J., & D. F. Hawkins (2003). *Consumer behavior: Building marketing strategy,* Chicago, IL: Irwin.

Jacoby, J. & L. B. Kaplan (1972). The components of perceived risk. (pp. 382-393). In M. Venkatesan (Ed). *Proceedings of the 3rd Annual Conference of the Association for Consumer Research.* College Park, MD: Association for Consumer Research.

Jarvenpaa, S. L. & P. A.Todd (1997). Consumer reactions to electronic shopping on the World Wide Web. *International Journal of Electronic Commerce, 1(2),* 59-88.

Kogan, N. & M. A. Wallach (1964). *Risk taking, a study in cognition and personality,* New York, NY: Holt, Rinehart, and Winston.

Kogan N. & M. A. Wallach (1967). Group risk taking as a function of members' anxiety and defensiveness levels. *Journal of Personality, 35(1),* 50-63.

Liebermann, Y. & S. Stashevsky (2002). Perceived risks as barriers to Internet and E-commerce usage. *Qualitative Market Research: An International Journal, 5(4),* 291-300.

Lim, N. (2003). Consumer perceived risk: Sources versus consequences. *Electronic Consumer Research and Applications, 2,* 216-28.

Locander, W. & P. Herman (1979). The effect of self-confidence and anxiety on information seeking in consumer risk reduction. *Journal of Marketing Research, 16,* 268-74.

Lutz, R. J. & P. J. Reilly (1973). An exploration of the effects of perceived social and performance risk on consumer information acquisition. (pp. 393-405). In S. Ward & P. Wright (Eds.). *Advances in Consumer Research.* Ann Arbor, MI: Association for Consumer Research.

MacCrimmon, K. R. & D. A. Wehrung (1986). *Taking risks: the management of uncertainty,* New York, NY: The Free Press.

Meuter, M. L., Ostorm, A. L., Roundtree, R. I. & M. J. Bitner. (2000), Self-service technologies: Understanding customer satisfaction with technology-based service encounters. *Journal of Marketing, 64(July),* 50-64.

Midgley, D. F. (1983). Patterns of interpersonal information seeking for the purchase of a symbolic product. *Journal of Marketing Research, 20,* 74-83.

Mitchell, V-W. (1992). Understanding consumers' behavior: Can perceived risk theory help? *Management Decision, 30(3),* 26-31.

Mitchell, V-W. (1999). Consumer perceived risk: Conceptualizations and models. *European Journal of Marketing,33(1/2),* 163-95.

Mitra, K., Reiss, M. C. & L. M. Capella (1999). An examination of perceived risk, information search, and behavior intentions in search, experience and credence services. *Journal of Services Marketing, 13(3),* 208-28.

Murray, K. B. (1991). A test of service marketing theory: Consumer information acquisition activities. *Journal of Marketing, 55(January),* 10-25.

Murray, K. B. and J. L. Schlacter. (1990). The impact of services versus goods on consumers' assessment of perceived risk. *Journal of the Academy of Marketing Science, 18(1),* 51-65.

Parasuraman, A, Zeithaml, V. A. & L. L. Berry (1985). A conceptual model of service quality and its implications for future research. *Journal of Marketing, 49,* 41-50.

Perry, M. & C. B. Hamm (1969). Canonical analysis of relations between socioeconomic risk and personal influence in purchase decisions. *Journal of Marketing Research,* 6, 351-54.

Pollatsek, A. & A. Tversky (1970). A theory of risk. *Journal of Mathematical Psychology, 7,* 540-553.

Rapoport A. & T. S. Wallsten (1972). Individual decision behavior. *Annual Review of Psychology, 23,* 131-76.

Roselius, T. (1971). Consumer ranking of risk reduction methods. *Journal of Marketing, 35(1),* 56 Stone -61.

Stone, R. N. & F. W. Winter. (1987). Risk: Is it still uncertainty times consequences? In R. W. Belk, et al (Eds.). (pp. 261-65). *Proceedings of the American Marketing Association (Winter Educators Conference).* Chicago, IL: American Marketing Association.

Tan, S. J. (1999). Strategies for reducing consumers' risk aversion in Internet shopping. *Journal of Consumer Marketing, 16(2),* 163-80.

Vijayasarathy, L. R. & J. M. Jones. (2000). Print and Internet catalog shopping: Assessing attitudes and intentions. *Internet Research: Electronic Networking Applications and Policy, 10(3),* 191-202.

Zeithaml, V. A. & M. J. Bitner. (2003). *Services marketing: Integrating customer focus across the firm, 3rd edition.* New York, NY: McGraw-Hill.

PERCEPTIONS OF COMMUNICATION TRAINING AMONG COLLEGIATE AVIATION FLIGHT EDUCATORS

Lorelei E. Ruiz
Southern Illinois University Carbondale
Carbondale, Illinois

ABSTRACT

This paper reports on the opinions of educators regarding communication training in University Aviation Association (UAA) member collegiate aviation flight programs. Educators representing 37 UAA member flight programs indicated their levels of agreement with a battery of statements regarding communication training on a five-point Likert scale. Chi square and Mann-Whitney analysis of responses indicates that these educators agree on the importance of communication skills, the purpose of written assignments, and their institution's preparation of students to communicate effectively in industry. Opinions are more varied regarding the integration of more communication assignments and the willingness of institutions to compensate those instructors who choose to incorporate such assignments.

INTRODUCTION

The idea that pilots need to be able to communicate well is not a new one. Attempts to develop international air traffic control (ATC) rules addressing language and pilots' needs to communicate date back to 1922 (Orlando, n.d.). Current Federal Aviation Regulations require pilot certificate applicants to read, speak, write, and understand English (Certification: Pilots & Instructors, 2000). Lintner and Buckles (1992) note the obvious—that "the [ATC] system cannot work unless pilots and controllers can communicate effectively and understand each other" (p. 254). To underscore the statement, they note that approximately 254 of 872 operational errors (violations of aircraft separation minima) occurring in 1990 "involved some type of communication deficiency" (Lintner & Buckles, p. 254). Writing skills may not be required during the most critical phases of a pilot's job, but they are important at other times; oral

Lorelei E. Ruiz is an assistant professor in the Aviation Flight program at Southern Illinois University Carbondale (SIUC). She holds a Bachelor of Science degree in Aviation Management and a Master of Science degree in Workforce Education and Development, both from SIUC.

communication skills are a must, and computer literacy as related to flight automation is becoming more and more important. Additionally, air traffic controllers, aircraft maintenance technicians, line service personnel, dispatchers, flight attendants, gate agents, and others must be able to clearly convey pertinent information to the appropriate people at the appropriate time. Ultimately, the safety of every flight relies on effective communication between all parties involved with that flight.

One recent study has shown that aviation leaders noted "significant deficiencies in the aviation community in the ability to communicate and recommended basic writing and verbal skills including grammar, spelling, punctuation, and speaking be incorporated into the curriculum" (Kutz, 2000, p. 24). Ragan (1997) points out that "[e]ven native English-speaking students—especially American students coming out of high schools less prepared verbally and mathematically for the challenges of any academic pursuit—need some sort of support to help them become more proficient with language" (p. 33). For pilots and controllers in particular, the choice of words can greatly affect a flight outcome.

"If someone talks in a way that does not fit with our idea of how a credible speaker should talk, we're less likely to pay attention to what that person has to say," says Bruce E. Gronbeck, a professor of communication studies at the University of Iowa. Teaching students different dialects to suit different situations is what experts call 'code switching.' Without it, students might get typecast as ditzy or dumb. (Schneider, 1999, p. A16-18)

Without a good working knowledge of standard aviation phraseology, sounding ditzy or dumb can be the least of a pilot's worries. Aircraft accident reports such as Avianca Flight 052 (National Transportation Safety Board, 1990) and United Flight 2860 (National Transportation Safety Board, 1978) indicate a need for clear communication.

Educators approach communication training in a variety of ways. University Aviation Association (UAA) member collegiate aviation flight programs employ a number of ways to work communication training and assignments utilizing communication skills into the curriculum (Ruiz, 2003). This paper reports on the perceptions that aviation flight educators hold regarding communication training and the use of assignments utilizing communication skills. It also reports on the opinions that respondents whose institutions employ a Writing across the Curriculum (WAC) program hold of WAC.

PERCEPTIONS OF COMMUNICATION ASSIGNMENTS

A review of literature regarding views of assignments that utilize communication skills shows that perceptions vary widely among students and educators alike, and not just in aviation. Munter (1999) sums up the

concerns that many students and educators have. Discussing writing assignments, and WAC specifically, she notes that the incorporation of such assignments into different courses can be problematic because: a) the writing assignments are not representative of the writing that will be expected in industry; b) faculty are not properly trained to teach writing; and c) the time spent on properly developing student writing skills is inadequate. Similar arguments are made for speaking and other communication skills (Morello, 2000; Schneider, 1999).

Student Perceptions

Students often balk at the prospect of having to write a term paper, and that may be justifiable. Assignments need to mirror the types of communication they can realistically expect to encounter. Few of them will be required as professional pilots to write a seven to ten page report on the development of GPS or the pros and cons of Free Flight. Too many times, these become exercises in parroting information and using the cut and paste function on the computer. While such an assignment may increase a student's knowledge base for a particular subject, it does not necessarily improve communication skills.

In a study designed to gauge students' and teachers' perceptions of the effects of writing assignments on students' writing ability and learning, students surveyed indicated that while the writing assignments generally improved both their overall writing skills and their learning of course content, the benefit to writing skills was not as great as the benefit to knowledge levels (Beason & Darrow, 1997). The researchers noted that students believed the assignments helped them understand course concepts, retain and recall information, and introduced them to professional publications that would be beneficial to them in their future careers. However, some of the same students indicated in post-survey interviews that the benefits were not as great as they would have liked due partly to a perceived lack of feedback.

Other researchers report similarly positive feedback from students. Lutte (1996) notes that "students accepted and enjoyed the case analysis course . . . [and] . . . indicated they improved in areas such as communication and comprehension and retention of complicated concepts" (p. 18). Garner (1994) learned via an open-ended class evaluation that 80% of 100 students believed that microtheme assignments-short (150-200 word) written expositions designed to foster more critical thinking-should be continued in accounting classes.

Faculty perceptions

Instructors may balk at the prospect of having to play grammar teacher and the idea of more work to be graded. Young and Fulwiler (1986) note that the incorporation of writing assignments into more courses places "some responsibility for assigning and evaluating with every teacher" (p. 1). However, the resources required for the evaluation may not be available. Kalmbach and Gorman (1986) noted in their 1982 survey that faculty objections against the implementation of a WAC program included a lack of institutional support, lack of time, large class sizes, and course content not compatible with writing.

Additionally, some instructors in the fields of written and oral communication do not support the across the curriculum movements that have been gaining ground since the 1970s. The feeling is that instructors in other fields are not qualified to teach writing and speaking skills (Morello, 2000, Schneider, 1999). Of course, the instructors in other fields argue that they are not teaching, for example, speaking skills per se; they are using speaking as a medium through which students learn and, incidentally, improve their speaking skills (Schneider, 1999).

For those concerned about the proper assessment of assignments, the literature addresses several concerns. Riley (1996) points out that, in his experience, marking up a paper for common writing mistakes seldom restrains a student's motivation or creativity. Gribbin (1991), in discussing graded versus ungraded writing assignments, notes that while improper usage and spelling may undermine the credibility of a product, the main thrust of the evaluation should not be on the mechanics (grammar, spelling, and punctuation), but on the overall product and the thinking and learning behind it. The implication is that the mechanics of writing are not ignored, but that in some assignments they are only a small part of the grade. In the end, the instructor must determine whether the assessment will focus more on content or communication skills, and then convey that to the student.

While these are issues that must be addressed, educators do recognize that such assignments hold benefits for students. For example, in a national study of journalism and mass communication faculty, Panici and McKee (1997) report that respondents indicate that WAC courses help students by fostering critical thinking, promoting better analysis and synthesis of information, encouraging precision in written work, and reinforcing learning.

RESEARCH QUESTIONS

For this paper, the researcher wished to determine the opinions of aviation educators regarding communication training and assignments utilizing communication skills in a UAA member collegiate aviation flight program. The research questions to be answered included:

1. As perceived by collegiate aviation educators, of what importance are communication skills—in particular oral, written, electronic, and visual communication skills—to students graduating from a program preparing them for a career in aviation?
2. What are aviation educators' opinions of their institution's ability to adequately prepare students to communicate effectively in the aviation industry?
3. What are aviation educators' perceptions of the purpose of written assignments for aviation students?
4. To what extent are aviation educators receptive to the integration of more communication assignments in their courses?
5. What are aviation educators' perceptions of their institutions' willingness to facilitate the implementation of more communication assignments?
6. What are the perceptions of aviation educators regarding the benefits of WAC in collegiate aviation?

METHODOLOGY

To answer these research questions, a population was identified using the 2001-2002 UAA Institutional Members list. Of 119 total institutions, the 115 institutions located in the United States and its territories were chosen for this study.

A cover letter, four-page survey, and postage-paid, return envelope were sent to each institution's contact person. The three-part survey requested basic demographic information, general information related to existing communication training within aviation programs, and WAC-specific information. The surveys were printed on green paper, as King, Pealer and Bernard (2001) note some studies that suggest that this can increase response rates. Four weeks after the initial mailing, follow-up letters were sent to all of the institutions.

To check the validity of the survey instrument, it was distributed to two experts for their review. The survey was also given to four colleagues who teach or have taught ground school courses in a flight training program to test the instrument for reliability.

RESULTS

Of the 115 institutions contacted, 37 (32%) returned completed surveys. This low response rate can only partially be attributed to the fact that not all UAA-member institutions offer aviation flight training. A review of the Collegiate Aviation Guide (CAG; Kitely, 1999) and supplementary web searches yielded the following information. Of the surveyed institutions, 92

offer some level of flight training, and 22 do not. The researcher was unable to determine program offerings of the one remaining institution. This yields a response rate of 40% for surveyed institutions known to offer flight training.

While Babbie (1992) suggests a 50% response rate is recommended for mail surveys sampling a population, he admits that this is only a guide. This particular study attempted to survey the entire population and not a sample. To determine the possibility of response bias, analysis of various characteristics of the responding institutions was attempted utilizing information gleaned from the CAG, the World Wide Web, and demographic information reported by respondents. Due to incomplete information reported in the CAG and the changing membership in the UAA, it was difficult to exactly match the surveyed population. Only 62 of the surveyed institutions, that were UAA members in 2001-2002, had information reported in the 1999 CAG, and the information given on these institutions was not necessarily complete. Therefore, internal analysis for response bias was not completed.

Statistics used to interpret the data include descriptive statistics (frequency counts, means, and standard deviations), the Pearson Chi-square, and the Mann-Whitney U. An alpha level of 0.05 was used to determine significance in statistical tests.

Demographics

The 37 respondents were either department chairpersons (25) or senior faculty members (12) at their institutions. One had earned an Associate degree, six a Bachelor's degree, seventeen a Master's degree, eleven a Doctorate degree, and one indicated Specialist. One respondent did not indicate an education level. They averaged eight years in their current position, with 16 employed five years or less, 11 from six to ten years, 4 from eleven to fifteen years, 2 from sixteen to twenty years, and 4 with more than twenty years in the current position.

Institutions represented both two-year colleges (17) and four-year universities (21). One respondent indicated both. Overall student enrollments reported by the institutions range from 100 students to 55,000 students, and flight training enrollments range from 10 students to 300 students. Associate degrees in aviation are offered by 18 of the institutions, 21 institutions offer a Bachelor's degree, 6 offer a Master's degree and 1 reported offering a Doctorate degree. Respondents were asked to indicate the number of single-engine aircraft, multi-engine aircraft, flight training devices (FTDs)/simulators, and personal computer advanced training devices (PCATDs) their institutions operate. Eighteen respondents (49%) indicated the actual number while the remainder checked which types of equipment

were available. Therefore, only the number of respondents indicating the use of a certain type of equipment is reported here. Equipment utilized in flight training by the responding institutions include single-engine aircraft (32 institutions), multi-engine aircraft (27 institutions), FTD/simulators (33 institutions), PCATDs (22 institutions), and one respondent reported none of the above.

Perceptions of importance of communication skills

The survey asked respondents to rate the importance of certain communication skills—oral, written, electronic, and visual communication—to students entering an aviation career upon graduation from an aviation-related program. Respondents rated each of the four communication skills using a Likert scale, with 5 meaning very important for students to have upon graduating from a program preparing them for a career in aviation to 1 meaning not at all important. Table 1 presents descriptive statistics derived from the responses received. Additionally, respondents were asked to indicate their level of agreement or disagreement with a listing of 14 statements written to gather perceptions of communication training and assignments incorporating specific communication skills. These 14 statements are included in Appendix A. The first two of these statements relate to the importance of communication skills. A five-point Likert rating scale was used (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree).

Perceptions of communication training

The remaining 12 statements included in Appendix A elicited respondents' perceptions of communication training and written assignments at their institutions. Descriptive statistics on the responses are shown in Table 2.

Table 1. Perceived importance of four types of communication skills, by University Aviation Association members, 2003

	N	*Minimum Value*	*Maximum Value*	*M*	*SD*
Oral Communication	37	2	5	4.70	0.66
Written Communication	37	1	5	4.32	0.91
Electronic Communication	37	3	5	4.07	0.74
Visual Communication	37	2	5	4.05	0.81

Table 2. Responses to statements about communication training and assignments incorporating specific communication skills, by University Aviation Association members, 2003

	N	*Minimum Value*	*Maximum Value*	*M*	*SD*
Communication skills are important in the aviation industry.	37	4	5	4.83	0.37
Developing good communication skills goes hand-in-hand with developing the critical thinking skills necessary in the aviation industry.	37	2	5	4.56	0.64
Students entering my institution's aviation program already possess the communication skills necessary for an aviation career.	37	1	4	2.10	0.80
Students graduating from my institution's aviation program possess the communication skills necessary for an aviation career.	37	2	5	3.89	0.69
My institution's general education coursework prepares students to communicate effectively in the industry.	37	2	5	3.45	0.80
My institution's aviation program prepares students to communicate effectively in the industry.	37	2	5	3.94	0.66
The purpose of writing assignments within my institution's aviation programs is to enhance the student's knowledge of course material (writing-to-learn).	37	2	5	4.00	0.66
The purpose of writing assignments within my institution's aviation programs is to enhance the student's ability to communicate effectively through writing (learning-to-write).	37	2	5	3.97	0.68
My institution's aviation program(s) could do better at preparing students to communicate effectively in industry.	37	2	4	4.05	0.70
Instructors at my institution incorporate adequate communication assignments into their courses to prepare students for an aviation career.	37	1	5	3.43	0.89
Incorporating more writing/speaking assignments into my institution's aviation programs would limit the amount of aviation material instructors could cover in each course.	37	1	5	3.17	1.19

Table 2. Responses to statements about communication training and assignments incorporating specific communication skills, by University Aviation Association members, 2003 (continued)

	N	*Mini-mum Value*	*Maxi-mum Value*	*M*	*SD*
Instructors at my institution would be willing to incorporate more written, oral, electronic, and/or visual communication assignments into existing curricula to enhance students' communication skills.	37	2	5	3.54	0.80
Communication skills should be taught by English and speech teachers, not aviation faculty.	36	1	5	2.47	1.08
My institution would consider some additional benefit/incentive for instructors who incorporate more communication assignments into their courses.	37	1	5	2.81	1.17

Perceptions of Writing across the Curriculum

Respondents were asked to indicate whether their institution offers a WAC program. Those respondents reporting a WAC program responded to a question regarding perceived benefits that the institution's WAC program holds for students' communication skills. A list of these benefits is included in Appendix B. Respondents were asked to rate each of the perceived benefits using a Likert-type rating scale (5 = a very noticeable benefit, 4 = a moderate benefit, 3 = some benefit, 2 = very little benefit, and 1 = no benefit). Statistics on the responses are included in Table 3. Additionally, respondents were asked to indicate whether the institution's WAC program benefits students' communication skills, and if evidence of the benefit exists, whether it is anecdotal or quantitative.

DISCUSSION

Research Question 1

The first research question asked the following: As perceived by aviation educators, of what importance are communication skills—in particular oral, written, electronic, and visual communication skills—to students graduating from a program preparing them for a career in aviation.

Overall, respondents strongly agree (M = 4.84, SD = 0.37) with the statement that communication skills are important in the aviation industry. Educators rated all of the four communication skills presented—oral, written, electronic, and visual—as important communication skills to have upon graduating from a program preparing students for a career in aviation (see Table 1). Respondents also strongly agree (M = 4.58, SD = 0.65) with

the statement that the development of communication skills is related to the development of critical thinking skills that students will need in the aviation industry.

Table 3. Perceived benefits of Writing across the Curriculum programs, by University Aviation Association members, 2003

	N	*Minimum Value*	*Maximum Value*	*M*	*SD*
Improve mechanics of student writing	6	3	5	4.00	0.63
Improve student's oral communication	6	3	4	3.50	0.54
Improve student's computer literacy	6	3	4	3.67	0.51
Improve student's ability to express ideas clearly and convey messages accurately	6	4	5	4.17	0.41
Improve student's logic/thought processes/problem solving skills	6	3	4	3.67	0.51
Enhance student's learning and understanding of course material	6	3	4	3.83	0.40
Other	2	5	5	5.00	0.00

Of the four specific communication skills addressed, oral communication skills received the highest rating (M = 4.70). With a standard deviation of 0.66, it appears that educators generally agree that oral communication skills are very important. It should be noted that twenty-nine respondents rated oral communication skills as a 5 on the Likert scale; of the remaining eight respondents, six rated these skills as a 4, one as a 3, and one as a 2.

The remaining three communication skills—written, electronic, and visual—were generally rated as important skills for students to have, with mean scores of 4.32, 4.07, and 4.05, respectively. All had a standard deviation of less than 1.00, showing general agreement among the respondents; inspection of the data shows a spread for these skills that is not as strongly skewed to the right as for oral communication skills (see Table 4).

Chi-square analysis of the data shows a statistically significant difference between perceptions of department chairpersons and senior faculty members for written and visual communication (see Table 5). However, due to limitations associated with the Chi-square test, a further analysis was performed. Mann-Whitney analysis shows the differences to be significant for oral, written, and visual communication. In all three of these cases, department chairpersons rated the skills as more important than the

senior faculty members did, and lower standard deviations show better agreement among the department chairpersons (see Table 6). No significant differences were noted for type of institutional affiliation or WAC program status (see Table 5).

Table 4. Number of responses reflecting perceived importance of four communication skills, by University Aviation Association members, 2003

	Likert Scale Ranking				
	1	*2*	*3*	*4*	*5*
Oral Communication	0	1	1	6	29
Written Communication	1	0	5	11	20
Electronic Communication	0	0	9	17	12
Visual Communication	0	1	8	16	12

Table 5. Results of Mann-Whitney analysis of perceived important of four types of communication, by University Aviation Association members, 2003

	*Respondent position***		*Institutional affiliation*		*WAC program status***	
	U	*p*	*U*	*p*	*U*	*p*
Oral Communication	102.5	0.03*	151.5	0.70	140.0	0.35
Written Communication	85.0	0.01*	126.0	0.23	143.0	0.53
Electronic Communication	97.5	0.06	155.5	0.87	121.5	0.18
Visual Communication	85.5	0.02	146.5	0.64	124.0	0.21

N = 36 for institutional affiliation.
**N = 37 for respondent position and Writing across the Curriculum (WAC) program status.
*$p < .05$

Research Question 2

The second research question asked the following: What are aviation educators' opinions of their institution's ability to adequately prepare students to communicate effectively in the aviation industry.

Respondents disagree (M = 2.10, SD = 0.80) with the statement that students entering their institution come equipped with the communication skills they will need to pursue a career in aviation. Overall, they do agree (M = 3.89, SD = 0.69) with the statement that they believe their program's graduates have the communication skills they will need. Respondents also

tend to agree more with the statement that their aviation program gives students the communication skills they will need (M = 3.94, SD = 0.66) than with the statement that the institution's general education coursework gives them the skills they need (M = 3.45, SD = 0.80). The respondents also agree (M = 4.05, SD = 0.70) with the statement that their program could improve in its preparation of students to communicate in industry. Chi-square and Mann-Whitney analysis of these statements shows a statistically significant difference based on the respondent's position in answers to statements about the institutions general education coursework and aviation program preparing students to communicate effectively in the industry (see Table 7). Department chairpersons agree (M = 3.72, SD = 0.73) that the general education coursework at their institutions prepare students to communicate in the industry, while senior faculty members neither agree nor disagree (M = 2.92, SD = 0.67). Additionally, department chairpersons agree (M = 4.16, SD =0 .55) that their aviation programs prepare students to communicate effectively, while senior faculty members approach agreement (M = 3.50, SD = 0.67). No statistically significant differences in responses to these two statements were noted based on institutional affiliation or WAC program status. No statistically significant differences based on respondent position, institutional affiliation, or WAC program status were detected in responses to the statements about: a) students entering programs already possessing the communication skills necessary; b) students graduating programs possessing the communication skills necessary; or c) programs doing better at preparing students to community effectively.

Research Question 3

The third research questions asked the following: What are aviation educators' perceptions of the purpose of written assignments for aviation students.

Respondents agree that the purpose of writing assignments within their aviation program is to enhance the student's knowledge of course material (M = 4.00, SD = 0.66) and enhance the student's ability to communicate effectively through writing (M = 3.97, SD = 0.68). No statistically significant differences were detected in responses to these statements based on respondent position, institutional affiliation or WAC program status.

Research Question 4

The fourth research question asked: To what extent are aviation educators receptive to the integration of more communication assignments in their courses.

A series of four statements sought to elicit respondents' perceptions of working more communication assignments into the curriculum. The results

show that respondents generally neither agree nor disagree with these statements.

Respondents neither agree nor disagree that instructors at their institution incorporate adequate communication assignments into their courses to prepare students for an aviation career (M = 3.43, SD = 0.89). Chi-square and Mann-Whitney analysis of responses to this statement shows statistically significant differences based on respondent position and WAC program status (see Table 7). Department chairpersons approach agreement (M = 3.64, SD = 0.91) with the statement, while senior faculty members neither agree nor disagree (M = 3.0, SD = 0.74). Additionally, respondents from institutions without an established WAC program neither agree nor disagree (M = 3.09, SD = 0.95). Those reporting either an established or developing WAC program agree (M = 4.00, SD = 0.39) with the statement. A further breakdown of the data shows that while respondents from institutions that are developing a WAC program agree (M = 3.75, SD = 0.50), those from institutions with an established WAC program also agree more strongly (M = 4.1, SD = 0.32).

Respondents neither agree nor disagree with the idea that incorporating more writing or speaking assignments into the aviation program would limit the amount of aviation material instructors could cover in each course (M = 3.17, SD = 1.19). The higher standard deviation here reflects a wider range of opinions expressed overall on this statement than on any other statement. Mann-Whitney analysis shows that differences in responses to this statement based on institutional affiliation and WAC program status are significant (see Table 7). Respondents from two-year institutions approach agreement (M = 3.62, SD = 0.88) with the statement, while respondents from four-year institutions neither agree nor disagree (M = 2.70, SD = 1.22). Additionally, respondents whose institutions do not have an established WAC program approach agreement (M = 3.56, SD = 1.03) with the statement. Respondents whose institutions have an established or developing WAC program approach disagreement with the statement (M = 2.50, SD = 1.16). Further breakdown of the data shows that respondents whose institutions are developing a WAC program neither agree nor disagree with the statement (M = 3.00, SD = 0.81), while those reporting an established WAC program approach disagreement with the statement (M = 2.3, SD = 1.25).

Respondents neither agree nor disagree that instructors would be willing to incorporate more communication assignments into existing curricula to enhance students' communication skills (M = 3.54, SD = 0.80). There are no statistically significant differences in responses to this statement based on respondent position, institutional affiliation, or WAC program status.

Respondents neither agree nor disagree with the idea that communication skills should be taught by English and speech teachers (M = 2.47). Again, a high standard deviation (1.08) indicates a wider range of

opinion on this point. Mann-Whitney analysis shows a significant difference in responses based on WAC program status (see Table 7). Those respondents indicating no WAC program neither agree nor disagree with the statement (M = 2.78, SD = 1.17), while those reporting an established or developing program disagree (M = 1.92, SD = 0.64). There were no statistically significant differences in responses to this statement based on respondent position or institutional affiliation.

Table 6. Perceived important of four types of communication based on respondent's position, by University of Aviation Association members, 2003

	Mini-mum Value	Maxi-mum Value	M	SD
Oral Communications				
Department chairperson	4	5	4.88	0.33
Senior faculty	2	5	4.33	0.98
Written Communications				
Department chairperson	3	5	4.60	0.58
Senior faculty	1	5	3.75	1.21
Electronic Communications				
Department Chairperson	3	5	4.24	0.72
Senior faculty	3	5	3.75	0.75
Visual Communications				
Department Chairperson	3	5	4.28	0.61
Senior faculty	2	5	3.58	0.99

Note. A total of 25 department chairpersons and 12 senior faculty members responded.

Research Question 5

The fifth research question asked the following: What are aviation educators' perceptions of their institution's willingness to facilitate the implementation of more communication assignments.

Respondents neither agree nor disagree (M = 2.81) that their institution would offer some benefit or incentive to instructors who incorporate more communication assignments into their courses. The standard deviation of 1.17 indicates more variation in the responses received for this item.

Neither institutional affiliation nor respondent position had any significant effect on responses to this question. However, differences in responses based on WAC program status are statistically significant (see Table 7). Respondents whose institutions do not have a WAC program in

place neither agree nor disagree (M = 3.17) with the premise that their institution would consider a benefit/incentive for instructors incorporating more communication assignments. There is, however, a wide range of opinion among these respondents (SD = 1.19). Those whose institutions have a WAC program in place or are developing one do not agree that benefits/incentives would be considered (M = 2.21, SD = 0.89).

Research Question 6

The sixth research question asked the following: What are the perceptions of aviation educators regarding the benefits of WAC in collegiate aviation.

While ten respondents indicated having an established WAC program, only six of them (five department chairpersons and one senior faculty member) responded to the question regarding benefits. Of the six benefits to a WAC (see Appendix B), two benefits averaged a moderate rating or better (see Table 3). Respondents indicated that the WAC program benefited students by helping to improve the mechanics of student writing (M = 4.00, SD = 0.63) and helping to improve the student's ability to express ideas clearly and convey messages accurately (M = 4.16, SD = 0.41). The remaining four benefits were rated as being of some to moderate benefit to students. The uneven split between such a small number of department chairpersons and senior faculty members responding precludes further meaningful analysis of responses based on position. Chi-square and Mann-Whitney analysis revealed no significant differences in responses based on institutional affiliation.

When given the opportunity to list a benefit not already given, one respondent reported a "diminished opposition or willingness to complete written and oral assignments" as a very noticeable benefit that students derived from the program. Another respondent indicated the student's ability to "comply with a given format specification (e.g. APA)" as a very noticeable benefit.

Of the six respondents, five indicated anecdotal evidence of improvements in students' communication skills and one indicated no evidence of improvement. Inspection of the data reveals that the one respondent indicating no evidence of improvement is a senior faculty member, while the rest are department chairpersons.

Table 7. Results of Mann-Whitney analysis of statements about communication training and assignments incorporating specific communication skills, by University Aviation Association members, 2003

	Respondent position		*Institutional affiliation*		*WAC program status*	
	U	*p*	*U*	*p*	*U*	*p*
Communication skills are important in the aviation industry.	130.5	0.32	148.0	0.55	137.5	0.25
Developing good communication skills goes hand-in-hand with developing the critical thinking skills necessary in the aviation industry.	126.0	0.36	135.5	0.36	142.0	0.48
Students entering my institution's aviation program already possess the communication skills necessary for an aviation career.	143.5	0.82	110.5	0.08	125.0	0.22
Students graduating from my institution's aviation program possess the communication skills necessary for an aviation career.	102.5	0.08	159.0	0.97	151.0	0.72
My institution's general education coursework prepares students to communicate effectively in the industry.	67.5	0.00*	132.5	0.34	149.0	0.68
My institution's aviation program prepares students to communicate effectively in the industry.	77.5	0.00*	153.5	0.81	139.0	0.41
The purpose of writing assignments within my institution's aviation programs is to enhance the student's knowledge of course material (writing-to-learn).	98.5	0.05*	146.0	0.59	136.0	0.35
The purpose of writing assignments within my institution's aviation programs is to enhance the student's ability to communicate effectively through writing (learning-to-write).	114.0	0.15	152.5	0.77	153.0	0.75
My institution's aviation program(s) could do better at preparing students to communicate effectively in industry.	146.5	0.89	140.5	0.47	125.5	0.20

Table 7. Results of Mann-Whitney analysis of statements about communication training and assignments incorporating specific communication skills, by University Aviation Association members, 2003 (continued)

	Respondent position		*Institutional affiliation*		*WAC program status*	
	U	*p*	*U*	*p*	*U*	*p*
Instructors at my institution incorporate adequate communication assignments into their courses to prepare students for an aviation career.	78.5	0.01*	127.0	0.25	67.0	0.00*
Incorporating more writing/speaking assignments into my institution's aviation programs would limit the amount of aviation material instructors could cover in each course.	106.5	0.14	91.0	0.02*	82.5	0.01*
Instructors at my institution would be willing to incorporate more written, oral, electronic, and/or visual communication assignments into existing curricula to enhance students' communication skills.	126.0	0.40	156.0	0.89	128.0	0.26
Communication skills should be taught by English and speech teachers, not aviation faculty.**	109.0	0.21	125.5	0.34	87.0	0.02*
My institution would consider some additional benefit/incentive for instructors who incorporate more communication assignments into their courses.	145.5	0.88	128.0	.29	86.5	0.01*

N = 37 for all, but one, statement.
**N = 36.
*p < .05.

CONCLUSIONS

It appears that respondents generally believe that it is very important for students to have a good grasp of communication skills upon graduating from a program preparing them for a career in aviation. While each individual communication skill is perceived as important, respondents rate oral communication skills most highly, followed by written, electronic, and visual communication skills, respectively.

While respondents do not feel that students entering their programs possess the communication skills required for an aviation career, they do believe that their programs prepare their graduates to communicate effectively. They also appear to believe that there is room for improvement

within the program as far as communication training goes. Department chairpersons appear to have a higher opinion of the institution's ability to teach students communication skills than do senior faculty members.

Respondents agree that the purpose of writing assignments is both to enhance writing skills and improve knowledge of course content.

Initial analysis of responses to statements regarding the inclusion of more communication assignments in courses yields fairly neutral results. While it appears overall that respondents are not overly receptive to the integration of more communication assignments in their courses, they also are not overtly opposed. Of course, opinions varied widely and that must be considered. Further analysis shows that respondents from institutions with established WAC programs are more likely to agree that their instructors already incorporate sufficient communication assignments into their courses. They also are more likely to disagree with the statement that more writing and/or speaking assignments in the courses would limit the amount of aviation material they could cover in class.

Opinions also vary as to whether institutions would be willing and/or able to reward those teachers who do make an effort to include more communication assignments in coursework. Reasons for the differences in opinion based on WAC program status are unclear. One plausible explanation could be rooted in the program's ownership; this is, whether the push to establish a WAC program rooted among faculty or administration.

Finally, the results show that respondents perceive that a WAC program holds certain benefits for students, and some of these perceived benefits may be more noticeable than others. Given the anecdotal nature of any evidence, however, strong conclusions cannot be drawn from this study regarding the benefits of a WAC program as related to students' communication skills.

REFERENCES

Babbie, E. R. (1992). *The practice of social research. (6th ed.).* Belmont, CA: Wadsworth Publishing Company.

Beason, L., & Darrow, L. (1997). Listening as assessment: How students and teachers evaluate WAC. In K. B. Yancey & B. Huot (Eds.), *Assessing writing across the curriculum: Diverse approaches and practices* (pp. 97-121). Greenwich, CT: Ablex Publishing Corporation.

Certification: *Pilots & Flight Instructors,* 14 C.F.R. § 61 (2000).

Garner, R. M. (1994). An efficient approach to writing across the curriculum: Microthemes in accounting classes. *Journal of Education for Business, 69(4),* 211-216.

Gribbin, W. G. (1991). Writing *across the curriculum: Assignments and evaluation.* Clearing House, 64(6), 365-368.

Kalmbach, J. R., & Gorman, M. E. (1986). Surveying classroom practices: How teachers teach writing. In A. Yourn & T. Fulwiler (Eds.), *Writing across the disciplines: Research into practice* (pp. 68-85). Portsmouth, NH: Boynton/Cook Publishers.

King, K. A., Pealer, L. N., & Bernard, A. L. (2001). Increasing response rates to mail questionnaires: A review of inducement strategies. *American Journal of Health Education, 32(1),* 4-15.

Kitely, G. (Ed.). (1999). *Collegiate aviation guide: Reference of collegiate aviation programs.* Auburn, AL: University Aviation Association.

Kutz, M. N. (2000). Developing future aviation leaders: Advice from today's leaders! *The Journal of Aviation/Aerospace Education & Research, 9(3),* 21-32.

Lintner, T. M., & Buckles, J. K. (1992). Why can't we talk to each other?? *37th Annual Air Traffic Control Association Conference Proceedings,* 254-256.

Lutte, R. K. (1996). How to use case analysis as an entire semester course in aviation. *Journal of Air Transportation World Wide, 1,* 13-21.

Morello, J. T. (2000). Comparing speaking across the curriculum and writing across the curriculum programs. *Communication Education, 49,* 99-113.

Munter, M. (1999). Whacking WAC. *Business Communication Quarterly, 62,* 108-111.

National Transportation Safety Board. (1990). *Aircraft accident report – Avianca, The Airline of Columbia, Boeing 707-321B, HK 2016, Fuel exhaustion, Cove Neck, New Your, January 25, 1990 (Report No. NTSB/AAR-91/04).* Washington, DC: Author. (NTIX No. PB91-910404)

National Transportation Safety Board. (1978). *Aircraft accident report – United Airlines, Inc., Douglas DC-8-54, N8047U, near Kaysville, Utah, December 18, 1977 (Report No. NTAB-AAR-78-8).* Washington, DC: Author. (NTIS No. NTISUB/D/104-008)

Orlando International Air Traffic Control Tower. (n.d.). *The history of air traffic control.* Retrieved April 2, 2003, from http://www2.faa.gov/ats/mcoatct/History.htm

Panici, D. A., & McKee, K. B. (1997). Writing-across-the-curriculum within mass communication. *Journalism & Mass Communication Educator,51(4),* 47-53.

Ragan, P. H. (1997). Aviation English: An introduction. *The Journal of Aviation/Aerospace Education & Research, 7(2),* 25-36.

Riley, S. G. (1996). Craft meets art as professors try writing across the curriculum. *Journalism & Mass Communication Educator 50(4),* 77-81.

Ruiz, L. E. (2003). *The prevalence of writing across the curriculum in collegiate aviation flight education.* Manuscript submitted for publication.

Schneider, A. (1999). Taking aim at student incoherence. *The Chronicle of Higher Education, 45(29),* A16-A18.

Young, A., & Fulwiler, T. (Eds.). (1986). *Writing across the disciplines: Research into practice.* Portsmouth, NH: Boynton/Cook Publishers.

APPENDIX A

STATEMENTS ABOUT COMMUNICATION TRAINING AND ASSIGNMENTS INCORPORATING SPECIFIC COMMUNICATION SKILLS

1.	Communication skills are important in the aviation industry.
2.	Developing good communication skills goes hand-in-hand with developing the critical thinking skills necessary in the aviation industry.
3.	Students entering my institution's aviation program already possess the communication skills necessary for an aviation career.
4.	Students graduating from my institution's aviation program possess the communication skills necessary for an aviation career.
5.	My institution's general education coursework prepares students to communicate effectively in the industry.
6.	My institution's aviation program prepares students to communicate effectively in the industry.
7.	The purpose of writing assignments within my institution's aviation programs is to enhance the student's knowledge of course material (writing -to-learn).
8.	The purpose of writing assignments within my institution's aviation programs is to enhance the student's ability to communicate *effectively* through writing (learning-to-write).
9.	My institution's aviation program(s) could do better at preparing students to communicate effectively in industry.
10.	Instructors at my institution incorporate adequate communication assignments into their courses to prepare students for an aviation career.
11.	Incorporating more writing/speaking assignments into my institution's aviation programs would limit the amount of aviation material instructors could cover in each course.
12.	Instructors at my institution would be willing to incorporate more written, oral, electronic, and/or visual communication assignments into **existing curricula** to enhance students' communication skills.
13.	Communication skills should be taught by English and speech teachers, not aviation faculty.
14.	My institution would consider some additional benefit/incentive for instructors who incorporate more communication assignments into their courses.

APPENDIX B

PERCEIVED BENEFITS OF A WRITING ACROSS THE CURRICULUM PROGRAM

1. Improve mechanics of student writing (spelling, grammar, punctuation)
4. Improve student's oral communication (eliminating "ums," "you knows," etc.)
5. Improve student's computer literacy (use of work processing, email, Web searches, etc.)
6. Improve student's ability to express ideas clearly and convey messages accurately
7. Improve student's logic, thought processes, and problem solving skills
8. Enhance student's learning and understanding of course material
9. Other, please specify

ETHICS EDUCATION IN UNIVERSITY AVIATION MANAGEMENT PROGRAMS IN THE U.S.: PART THREE – QUALITATIVE ANALYSIS AND RECOMMENDATIONS

Dale B. Oderman
Purdue University
West Lafayette, Indiana

ABSTRACT

This three-part study examined how four-year U.S. universities with baccalaureate programs in aviation management include ethics instruction in their curricula. Part One justified the need for ethics education and developed hypotheses to evaluate the status of ethics instruction. Statistical tests in Parts Two A and Two B established that ethics is not widely included in aviation curricula. Part Three continues by probing for deeper understanding of current practice. It was found that little is being done to increase ethics instruction, as no sense of urgency exists to bring about change. Recommendations to improve ethics coverage include proactive involvement of those currently interested in the subject, cooperative relationships between academia and the aviation industry, and a phased program to increase the level of ethics inclusion in aviation curricula. Ideas for future study are suggested.

INTRODUCTION

It has been said that the term, business ethics, is an oxymoron. Looking at the long and growing list of corporate ethics scandals in the past several years would certainly reinforce this idea. If one were to look at discoveries made about corporate behavior in the aviation world, one could easily find additional support for this adage.

For instance, the now defunct ProAir, a Seattle-based air carrier, was charged with falsification of training and maintenance records, intentional

Dr. Dale Oderman is an Associate Professor in the Department of Aviation Technology, Purdue University, where he has taught since 1996. He received a Bachelor of Science degree in Astronautics from the U.S. Air Force Academy in 1968, a Master of Science in Aeronautical and Astronautical Engineering from Purdue University in 1969, and a Doctor of Philosophy degree in Higher Education Administration from Purdue University in 2001. He is a retired Air Force colonel who spent over 27 years in various pilot and operational staff positions throughout the world. He has an FAA commercial pilot license with multi-engine and instrument ratings.

cover-up of maintenance records, failure to report accidents and incidents to the Federal Aviation Administration (FAA) and the National Transportation Safety Board (NTSB), and numerous other things (AirJet News, 2000). Fine Air, a Miami-based cargo carrier now known as Arrow Air, was found guilty of obstructing justice and making false statements during the NTSB investigation of its 1997 DC-8 crash in Miami (Wilson, 2000). A sampling of many ethical violations by individual airline and airport employees includes pilfering passenger luggage (Leveque, 2003), participating in drug smuggling (Loney, 1999), and intentionally damaging aircraft to get more work (Skolnik, 2002). Can anything be done to reverse such trends?

Three earlier installments in this series of articles on ethics education in collegiate aviation management programs explained: (a) the need for studying ethics and some suggested hypotheses for investigating inclusion of ethics in aviation curricula (Oderman, 2002); (b) a survey and statistical description of current practices used by aviation departments to include ethics in their curricula (Oderman, 2003a); and (c) an extensive statistical evaluation of responses by aviation department heads about their departments' inclusion of ethics in their curricula (Oderman, 2003b). The aim of Part Three in this study is to go a step beyond the quantitative analysis of Part Two. (Part Two will be used throughout this report to refer to Parts Two A and Two B together.) Although Part Two produced data describing current practice concerning the teaching of ethics, the statistical distributions and analysis did not completely explain why or how ethics instruction is being implemented. Part Two determined that some schools have a much higher commitment to integrating ethics into their curricula than others; wanting to know why this is so, more research was needed.

RESEARCH DESIGN AND METHODOLOGY

To probe deeper, Part Three turns to qualitative research methods. The author conducted six individual interviews with department heads from universities and colleges that responded to the Part Two survey instrument. The author also interviewed aviation professors identified by their department heads as already demonstrating an interest in teaching ethics in collegiate aviation programs. Only four were so identified during the Part Two survey process, and all were interviewed.

Interviews – Department Heads

The author conducted telephone surveys with six aviation department heads. Based on responses to the Part Two survey and the resulting distribution of schools on the Ethics Inclusion Scale (EIS; Oderman, 2003a), the author divided responding universities into six groups. Group One represented schools with an EIS (or level of planned inclusion) of 1. Schools

with a level of planned inclusion of 2 and 3 were placed in Groups Two and Three, respectively. If a school had an EIS of 5, then it was placed in Group Four. All schools in Group Five had a level of planned inclusion of 6 through 8, and the members of Group Six had an EIS of 9. From the schools in each group, the author randomly selected one department head to be interviewed.

The telephone survey had two sections. The first was for departments that have already initiated efforts to incorporate ethics into their aviation management curricula, and the second was for departments that have done much less to establish ethics as part of their curricula. The author used the first section to interview Groups Four through Six and the second to interview Groups One through Three. The reason the dividing line was set between Groups Three and Four is that Groups Four through Six represent departments that actually have aviation professors teaching a course principally devoted to discussing ethics. In Groups One through Three, any efforts to include ethics instruction are either the result of isolated endeavors by one or a few aviation professors to discuss the subject in classes primarily devoted to other topics or only if an elective course taught outside the aviation department.

The aim in questioning the sample who include ethics instruction in their curricula was to discover the specifics of what they have done, why they have done what they have done, what obstacles they faced along the way, to what they attribute their successes or failures, and their general opinions on the effectiveness of their programs. The aim in questioning the sample from schools that have not included ethics in their curricula was to discover their reasoning for not doing so. The author sought to determine if they simply ignored the subject for no particular reason at all or whether not including ethics was a conscious decision. If for no particular reason at all, the author sought to determine if there was an awareness of ethical problems in the aviation industry. If not including ethics was a conscious decision, follow-up questions delved into reasons for such a decision. In describing interview results, the author looked for themes and repeated patterns in responses to both sections of the telephone interview.

Interviews – Faculty Members

A question on the study's written survey asked department heads to identify faculty members who have demonstrated an interest in teaching ethics and/or have initiated efforts to do so. Four professors gave permission to their department heads to identify them. The author followed-up with all four and asked questions about their experiences in bringing ethics to their curricula. The questions were based on those asked of heads of departments which currently include ethics in their curricula; however, the objective in

these interviews was to get the opinions of faculty who are possibly on the leading edge of implementing ethics instruction.

CONCLUDING PROCEDURES

To conclude this entire three-part research project, the findings in the reports of all three parts are combined to describe the current state of ethics instruction in collegiate aviation management programs. A number of recommendations are made, and several questions are formulated for future study.

RESULTS

All department heads and professors selected to be interviewed consented to a tape-recorded interview for accurate reporting and evaluation of their responses. It is noteworthy that in the professor interview category, in three of the four cases, department heads identified themselves as professors who have demonstrated an interest in the subject. One stated he has been interested in the subject for a long time and has incorporated ethics in all courses he teaches. A second stated that the current ethics component in the curriculum at his university has been there since before he arrived, but this fact was a reason which attracted him to come to that university. The third stated that he is alone when it comes to including ethics in aviation courses at his school. Thus, there was a wide range of experiences between the three department heads that identified themselves as interested professors.

The fourth professor identified by a department head as interested in ethics is an adjunct professor. Her perspective is unique in that her background is not in aviation. She has been around the aviation industry because of her husband's job as an aviation consultant, but her interest in ethics comes from time in the community health industry and strong personal interest. She has taught some general courses (technical writing, career development, and introductory management) for her school's aviation department for 15 years, and she incorporates ethics in those courses.

When interviewing these professors, the author used a telephone survey designed for professors rather than the one designed for department heads, and the responses of the professors are not included in the discussion of information derived from the six department heads that were selected randomly for this study. Nevertheless, it must be understood that the opinions given by the three department heads identifying themselves as interested professors also come from the perspective of being a department head.

A Comparison with Lessons from other Academic Areas

The telephone interview responses are used to illuminate the lessons learned from other academic areas as described in Part One (Oderman, 2002) and as evaluated statistically during Part Two (Oderman, 2003a; Oderman, 2003b) of this study.

Lesson one – the need for ethics instruction

The general conclusion reached previously about lesson one was that many aviation management department heads agree with the need to include ethics instruction in aviation curricula; however, their opinion is not necessarily supported with actual programs to do so. Part Three interviews supported this. Regardless of the EIS level of their school, all department heads stated that they see the need for ethics instruction in their curricula based on several factors. First, every department head reported that they have personally seen multiple situations in the aviation industry in which individual ethics or lack thereof created problems. No department heads had difficulty recounting stories of poor ethical behavior from their own days working in the industry. They cited such cases as intentionally misreporting information, gender issues, political payoffs, poor employer-employee relationships, lying about aircraft maintenance inspections, and failure to take needed safety action when it would cost the company money. To a question asking about the prevalence of ethical failures, most concurred that they were common during the period when they were in the industry. When asked about current impressions of industry ethics, they reported that the industry has improved somewhat, but also stated that they are not entirely sure about that since they are further removed from the industry now.

Secondly, department heads described what could best be called professional behavior. It is their unanimous belief that the aviation industry is an industry of professionals and that professionals need to assume responsibility for their actions and be held accountable for what they do. The heads believe there is an unwritten code within the industry that says certain behavioral standards should be met. Department heads sense a responsibility to send their graduates to industry with an awareness of expected professional standards and, thus, they stated that they seek to inculcate these values in students while still in school.

A third reason given by a couple of the department heads deals with a subject not specifically addressed in this paper but which should be mentioned. One department head stated it this way, "It's important since there is a general feeling that students today need more ethics." The implication is that the current generation of students has lower values than previous generations. This viewpoint is somewhat controversial, and evaluating it is certainly beyond the scope of this project. Nevertheless, it is

a perception maintained by many people across a variety of curricular areas. It definitely has an impact on pedagogical issues related to the best methods for bringing ethics into the classroom, and it is an area for further study.

Given these reasons for including ethics, it must also be noted that all department heads interviewed are comfortable with the way in which ethics is currently included in their curricula, regardless of where their schools fall on the EIS. In every case, department heads said that their university's current plan for including ethics in their aviation curricula existed prior to the time that they assumed the department head position. When asked about future plans in this area, four department heads said they have no plans to change. A fifth head said his department is considering adding a Master's degree program (beyond the realm of this study), and that faculty has expressed a desire for greater emphasis on ethics if this graduate program is eventually established. The sixth head mentioned that his department is planning to add an ethics component to a revised aviation safety course dealing with human factors. So, at the undergraduate level, most heads expressed complete satisfaction with current levels of including ethics regardless of the level of planned ethics inclusion.

Lesson two – higher-level support

In Part Two, the data indicated that few department heads consider a lack of higher-level academic administrator support to be problematic for including ethics in aviation curricula (Oderman, 2003a; Oderman, 2003b). During Part Three all department heads were asked the following open-ended question: "How could higher-level academic administration personnel help you in adding ethics to the curriculum?" Though all responded that their higher-level administrators do support including ethics in their aviation curricula, the heads also stated that there is not much that higher-level staff can do to assist them in adding ethics to the curricula. Curricular issues are generally decentralized at most campuses. Course content is left up to individual faculty members or small committees within departments. Higher-level personnel can encourage a topic like ethics, but usually do not mandate such things. Thus, the reason for the conclusion that lack of higher-level administrative support is not an obstacle is because department heads do not think that higher-level administrators can have much impact one way or the other on specific curricular issues like including ethics.

When the four aviation professors were asked a similar question, they responded similarly. Those that already have higher-level support (in the form of tacit approval of the current arrangement) stated that they are not sure what more can be done. The one professor who responded that there is not much support from above said the main thing higher-level administrators can do is to encourage adding ethics to the curriculum. He stated that the

administrators are not disinterested; they are simply not aware of the ethical problems in the industry, and consequently, do not care very much about resolving these problems from an educational standpoint.

Study data revealed that almost half of the department heads have faced or expect to face problems finding funding to include ethics in their curricula. They said that either fund will not be available or that they are not sure if they will be available. They cited the commonly known fact that funding is tight at most universities, including their own. Interesting though, they stated that even though more funding would be nice, more funding is not really needed to bring ethics into the curriculum. Those heads of departments already including ethics at the higher EIS levels pointed out that teaching ethics does not require much in the way of funding; it simply requires time in the curriculum which is a much more difficult problem to solve.

Adequate recognition of faculty for efforts to bring ethics into the curricula was mentioned as important in the Part One review of non-aviation academic areas (Oderman, 2002). Though not studied in Part Two, a specific question was asked during Part Three about this. All department heads were asked if faculty members would receive promotion and tenure recognition for efforts to bring ethics into the curriculum. Responses were mixed; however, a general thread ran through the answers regardless of the school's EIS level. By itself, adding ethics to the curriculum can be mentioned in promotion and tenure documents, but it probably would not be very significant. If, however, a professor did scholarly activity in the area like publishing research about ethics, then he or she would receive recognition during the promotion and tenure process.

Since promotion and tenure are of concern to faculty members, the four professors were asked about this issue. None gave an unqualified supportive answer. One said efforts to bring ethics to the curriculum would be supported at the department level, but she was unsure of its impact beyond that. One of the schools does not have a tenure process so it was not applicable. A third said lip service would be given to it but not much more than that. The fourth said it could be put in a promotion and tenure document, but it is not being done now.

Generally then, in Part Three, as in Part Two, department heads and professors do not think higher-level administrators can make a major difference in offering ethics in aviation curricula. Upper echelons stay out of curricular content issues, additional funding for including ethics is not anticipated (nor perceived to be needed), and efforts to include ethics in the curriculum would not have much impact on promotion and tenure.

Lesson three – importance of departmental advocates

Earlier study data substantiated the hypothesis that an interested department head or faculty member can have an impact on including ethics in the curricula. The impact of the department head will be discussed in a later section dealing with factors influencing educational change. Regarding faculty contributions, questions were asked during Part Three about depth of faculty support for including ethics in the curriculum. All heads responded without hesitation that there is strong faculty support for the current level of ethics in their programs. As to the most likely way in which faculty demonstrate this support, heads said that professors talk about it in classes as the subject arises, implying that ethics is not necessarily a preplanned topic. While it is good that faculty members support ethics instruction by discussing it in class when the subject is raised, this also illustrates a subtle difference between support and advocacy.

Earlier in the discussion about the need for ethics instruction it was mentioned that two of the interviewed department heads discussed possible changes to their curricula (one at the graduate level and one at the baccalaureate level) to include more ethics. In both cases interested faculty members initiated these proposed changes. These examples demonstrate advocacy as opposed to mere support. The professor who is an advocate will take steps ahead of time to include ethics in course content or will develop his or her own materials on aviation ethics to use in class.

Needless to say, interviews with the four professors supported the conclusion that professors who are advocates can make a difference. All four stated that they include discussions about ethical principles and practice in all classes they teach because they see a strong need for such in developing their students into responsible industry professionals.

Lesson four – the pervasive method

Data from Part Two gave a distribution of schools by using the EIS, and only five schools in the database were classified as pervasive (Oderman, 2003a). The interviews did not raise new information about EIS classification of schools in the study; however, the interviews did answer a question concerning the small number of schools at higher levels of inclusion. As mentioned earlier, all department heads interviewed reflected a degree of satisfaction with their school's current level of planned ethics inclusion. The implication of this for the future is that if it is truly desirable to teach ethics pervasively, then the level of satisfaction that department heads currently experience must be lowered. The question is how to accomplish this, and this question will be addressed later.

Lesson five – involvement and training of faculty

The earlier conclusions dealing with this lesson were that few aviation professors are teaching anything about ethics in their classes, that most department heads support special training for aviation professors to teach ethics, and that department heads from departments whose professors do teach ethics are more likely to fund such training. Regarding the first conclusion, there appears to be a discrepancy between the written surveys and the telephone interviews. Interviewed department heads indicated a wider level of faculty involvement in teaching ethics than generally reported on the written survey instruments. A possible explanation is the lack of differentiation in terms during telephone interviews when discussing breadth of faculty support. The written surveys clearly specified teaching ethics as a planned topic, not just as a subject that gets mentioned in an impromptu manner during discussion about other material. Most aviation professors will casually discuss issues like professional behavior when applicable subjects are raised in class; however, the real question is whether a professor thinks the subject is important enough that he or she actually plans ahead to raise it in an organized and thought-out manner before class ever starts.

The issue of willingness to provide training to aviation professors was not directly raised during Part Three, and it did not come up in any of the conversations. Department heads were asked how their current faculty members acquired their expertise in this area in order to teach the subject in the classroom. All mentioned industry experience. Though this study did not delve into pedagogical methods, most of the department heads stated that the primary method used by faculty to discuss ethics is case study and example. For this method of bringing ethics to the classroom, industry experience does provide a very good training ground because, as the department heads testified, there are a lot of examples of poor ethics in the industry. Most aviation educators can relate some of them from personal knowledge (not involvement).

Another question for future study is how to most effectively teach ethics in the classroom in terms of course content and delivery method. The author suspects that a balance between ethical theory and ethical practice in an aviation course would be most effective. Although most aviation educators have a good repertoire of stories from industry, they may not have much basis for talking about ethical theory. Thus, training or self-study would be essential. As one department head said, training would require funding of some kind, even if it means nothing more than release time to accomplish such training.

The interviews with professors confirmed that they had never received formal training in ethics. All said they draw on personal experiences, for half of them this experience includes years of military service. One

mentioned personal reading, and another mentioned discussions of the topic while attending meetings of national aviation organizations like the Council on Aviation Accreditation and the University Aviation Association. If ethics education is to go beyond discussion of cases, it seems apparent that some training or self-study dealing in ethical theory is essential as only one department head or professor interviewed stated that he has such a background.

Lesson six – influence of outside support

The conclusion concerning lesson six was that the most influential support from outside the university for helping to establish ethics as part of aviation curricula comes in the form of accreditation standards. Apart from accrediting bodies, the only other significant input that comes to higher education institutions comes by way of representatives from industry in the form of guest speakers on the subject of ethics. Thus, outside support does not appear to be very influential except in a negative sense, that is, a mandate to include an ethics component in the curriculum or lose your accreditation. Part Three confirmed this observation as no department heads cited anything that outside organizations, specifically the aviation industry, are currently doing to help educators bring ethics to their students.

During the interviews, department heads were asked an open-ended question about outside support, specifically: "How could the aviation industry help you in adding ethics to your curriculum?" Almost all said there has to be feedback from industry to academia. Many collegiate aviation departments have industrial advisory committees with members from the aviation industry who agree to advise the departments about industry trends, needs, problems, forecasts, requirements, and other areas. In the area of ethics, companies need to provide feedback to universities about the current ethical climate in the industry. They should talk about ethical problems they face, and they need to communicate observations and perceptions. Without this feedback educators will assume this is not a problem or will certainly underestimate its significance.

Department heads suggest industry could also assist in curriculum development. Industry could provide case studies (sanitized if need be) to help professors have real-world examples for class discussion. Department heads report a dearth of published materials on ethics that are aviation specific. With educational institutions lacking funds, department heads see this as a place where industrial funding could greatly complement educational efforts. The heads are aware of other educational projects that have been successfully conducted with cooperation and support of industry; they see potential for the same thing in bringing ethics to aviation curricula.

Two other ideas were voiced by a couple of department heads. First, one head suggested that industry can participate in seminars or symposiums on the subject of ethics at professional aviation educational organization meetings. This would promote discussion of the subject and produce wider coverage of this important topic. Another head reiterated the idea studied in Part Two of guest speakers addressing students in the classroom (Oderman, 2003a; Oderman, 2003b). In sum, the department heads do not view lack of industry support as an obstacle, but they do see clear and practical ways that industry can be a catalyst for more substantial coverage of ethics in college curricula.

All four professors also mentioned lack of written materials specifically focusing on ethics in aviation. When asked how industry can help them, they stated that industry can fill the void in the area of published materials, that industry can provide feedback to help academicians understand the ethical problems with which they deal, and that they can make ethics training an item of interest during the hiring process. In short, they called for a more active role in the whole process by the aviation industry.

Lesson seven – modeling

This lesson was not studied during Part Two (Oderman, 2003a; Oderman, 2003b). It was addressed indirectly during telephone interviews with heads of departments with an EIS of 5 and higher in the form of open-ended questions dealing with the effectiveness of their ethics instruction programs, the success of efforts to incorporate ethics, and the receptivity of students to such instruction. Modeling had to be addressed indirectly because asking a direct question, such as "Do your professors model ethics before their students," would most likely receive an affirmative answer.

With this in mind, it is interesting that all three department heads commented on the importance of modeling at some time during the interview. One said, "Professionalism and ethics go hand in hand. Atmosphere is very important, and we try to create this right away." Another said, "It is important to set a good example for students. We don't have to include it [ethics] – we choose to. Why? It is an important part of life." The third said, "We have very respected professors who teach these courses. They are good role models and bring strong personal ethics to their courses." One of the professors confirmed this by saying, "You must live by the ethics you promote in class. By doing that you are as effective in getting the principles across as anything." That modeling is essential is intuitively obvious; the interviews confirmed it.

Lesson eight – obstacles

Specific conclusions were drawn earlier about certain obstacles to including ethics in aviation curricula. The intent of the telephone interviews was to discover how department heads had faced and overcame these obstacles. Although questions were prepared on this subject, they were never asked because none of the department heads interviewed had anything to do with establishing the ethics content in their universities' current curricula. Nevertheless, earlier conclusions were confirmed in Part Three. Without specifically asking department heads to identify obstacles, several identified two obstacles in their interviews. Two heads, from both ends of the EIS spectrum, mentioned lack of time in the curriculum for ethics. Several heads from across the EIS spectrum mentioned lack of good course materials specifically related to the aviation industry.

All of professors interviewed confirmed the lack of good course materials, and two also mentioned lack of time in the curriculum for separate courses on ethics. They specifically mentioned that they would never be able to add a separate ethics course because of all the other requirements, so the only way for them to get ethics into the program is to add it piece by piece to other related courses.

A Comparison with Lessons from Fullan and Stiegelbauer

The telephone interview responses were used to illuminate the factors affecting educational change learned from Fullan and Stiegelbauer (1991) as described in the Part One literature review (Oderman, 2002) and as evaluated statistically during Part Two of this study (Oderman, 2003a; Oderman, 2003b).

Factor one – connection between publications and change

The study's hypothesis regarding this factor said that aviation departments would be hesitant to initiate and fund ethics instruction programs because little has been published on the subject in the aviation academic community. Though a direct question was not asked to tie connections between publications and change, several thoughts can be inferred from the department head interviews. First, as mentioned previously, all are content with their department's current level of ethics inclusion, and there is no sense of urgency to make any major changes. Second, most mentioned the lack of written materials specifically dealing with ethics in the aviation industry. Third, although all the heads were able to recollect several instances of unethical behavior in the industry while they were in it, they had a less clear picture of the current status of ethics in the industry.

If one puts these facts together, it reasonable to conclude that department heads are content with the status quo because they may simply be unaware of the prevalence of the current problem. This is certainly not an indictment against the department heads as several also said that one of the key ways in which industry could help academia is to provide feedback to universities in this very area, but it does appear that none have been proactive in seeking this information from the industry.

Again, it is important to reiterate that nothing could be found in any journals on the subject of ethics and aviation education. This reminds one of the old adage that the squeaky wheel gets the grease. Ethics is not perceived to be a squeaky wheel at the moment. Other priorities squeak more loudly. Thus, Fullan and Stiegelbauer's conclusion is correct as applied to aviation education.

Factor two – experience as a motivator

Factor two leads one to believe that department heads with more industry experience will be more likely to lead departments that have a higher level of planned ethics inclusion. Statistical analysis demonstrated that this hypothesis does not hold up. Part Three interviews surfaced reasons as to why this hypothesis fails. The department heads interviewed averaged 14.2 years of industry experience (9.8 years standard deviation and a range of 2 to 25 years). Yet despite the experience differences, all had no trouble describing multiple incidents of unethical behavior in the industry of which they were personally aware. Thus, based on their experience, they all saw situations in which there was a lack of ethics displayed, and length of experience was simply not a differentiating factor in their knowledge of industry ethics.

This held true for the professors interviewed except for the one adjunct professor with no direct aviation industry experience. The other three averaged close to 19 years of industry experience and could easily cite instances of ethical problems in industry. These incidents helped them bring ethics instruction to the classroom, but the motivating factor to include ethics did not go back to specific incidents they had observed. Rather, they had a picture in mind of professional behavior for aviation industry personnel, and they assumed responsibility for getting this across to students. Industry experience laid a foundation for course work, but it was not a differentiating factor for motivation to teach ethics in the first place.

Factor three – importance of administrative advocacy

Study data indicated that aviation management departments that currently include ethics are more likely to have department heads that support such efforts. Findings from Part Three illuminate this. Although all

department heads interviewed support including ethics, the heads representing departments with an EIS of 3 or lower are not advocating change to bring their departments to higher levels. The two heads representing colleges at EIS levels of 1 and 3 (indicating that ethics is not taught as a planned subject by aviation professors) stated that they are content to piggyback on ethics offerings outside the aviation department. When asked if they have plans to bring ethics education inside the department, both reported they have none at this time due to unnamed competing priorities. In these two departments, it would take an interested professor to initiate actions to begin discussing ethics as a preplanned topic in the aviation classroom.

The department head from the college with the EIS level of 2 spoke of a faculty member's plan (supported by the head) to add more ethics to another aviation course within the existing curriculum. This would not change the EIS level of this institution, however, because it already includes ethics in other aviation courses. Thus, in these three departments at the lowest three EIS levels, it would take an interested professor to initiate actions to raise departmental commitment to include ethics in their curricula.

The professor interviews validated department head support as important. The adjunct professor made a point of this, and the example of the three professors who are also department heads confirm this. In one case, the head is alone in his advocacy in that he is not actively supported from above nor has his faculty developed a sense of urgency on this. So he is the difference between some inclusion of ethics versus none.

The conclusion to be drawn here is that department heads can be very influential in defining the priorities of a department. If the department head thinks that ethics instruction should be a priority, he or she can bring this about through administrative leadership or sustained personal effort. If a department head does not set this as a priority, then it would take an interested faculty member to shape change.

Factor four – importance of professor advocacy

As seen previously, data demonstrated that despite low interest by aviation faculty in teaching ethics, when there is a faculty member who is interested in teaching ethics, departments are far more likely to have higher levels of ethics inclusion. As mentioned earlier, two of the six interviewed department heads discussed possible upcoming changes to their curricula. In both cases, faculty members initiated the changes. In the case of the four professors interviewed, their efforts either initiated or continued action to integrate ethics in their curricula.

Factor five – importance of external change agents

Factor five would suggest that aviation departments that have initiated changes to incorporate ethics are more likely to be ones that have been influenced by organizations outside the university. However, the conclusion drawn earlier in the study was that outside organizations have had very little influence in bringing ethics into collegiate aviation management programs and that this negligible impact is a partial reason for the lack of ethics education in aviation programs. Part Three supports this.

None of the six department heads and none of the four professors interviewed related any ways in which the aviation industry or any other outside organizations had helped them or even encouraged them to include ethics in their students' plans of study. One department head at the lower end of the EIS spectrum specifically mentioned that ethics education has not been raised as an issue by his department's industrial advisory board. Despite this lack of interest by industry, each department head and three of the professors have concrete ideas about how industry can assist in bringing viable ethics instruction to collegiate curricula. The apparent need for future progress in this area appears to be in some way connected to creating a relationship between industry and academia in which cooperative programs can be initiated to help each other.

Factor six – importance of accrediting agencies

Factor six was not specifically addressed in the prepared questions of the telephone survey instrument, and no department heads or professors raised the issue of accreditation. No department heads randomly selected to be interviewed represented any of the ten schools in which ethics is a component of accreditation standards so it is not surprising that these heads did not raise this issue.

Factor seven – slow step-by-step change

According to this factor, any curricular changes to incorporate ethics into aviation management programs at the higher education level will only proceed in a slow, step-by-step manner rather than proceeding from no ethics to the pervasive inclusion of ethics in a short period of time. The initial intent of Part Three was to identify one or more department heads that had been through the change process related to increasing ethics coverage in their programs and discuss the change process with them. Unfortunately, none of the department heads interviewed fell into that category.

When the department heads were asked what it would take to add more ethics to the curriculum than was currently being covered, they responded with the procedural means to make curriculum changes, that is, develop a

course, get a departmental committee to approve it, and then get faculty senate approval. Procedurally, this does not have to consume a lot of time. However, documenting course approval procedures was not the aim of this study.

Concerning this line of thought, though, it is interesting to note that department heads included in this study have had relatively short tenure as the head of an aviation management program. Among all 41 responding department heads, the average number of years as head of the department is only 4.63 (standard deviation – 3.63 years); it was even lower for the six heads interviewed in Part Three (average – 2.1 years, standard deviation – 0.73). The author does not know how this compares with department head tenure in other fields of academia, but the numbers stated appear to be very low. If the process of educational change is a very slow, step-by-step process, it is not surprising that none of the department heads interviewed were a part of the process that created the current ethics coverage in their curricula. If there was a lot of interest being generated on a national basis to change aviation curricula to include more ethics education and if this process was speedy, one would expect that some of the department heads would have been part of the change process, especially since they also have an average of 6.5 years of faculty experience before becoming department heads.

Despite their interest in the subject of ethics, none of the professors interviewed said that they have any specific plans to make changes either. Two of them expressly stated that their current efforts are sufficient. The other two said they are always looking for new ways and new materials to add more ethics to the curricula, but neither of them have any definite plans to implement in the future.

To summarize this point, it appears that the current state of affairs regarding ethics inclusion in collegiate aviation management programs has existed for quite a while without change. At the present time, change is not only slow, it is non-existent.

DISCUSSION AND CONCLUSIONS

The purpose of this research study was to describe and analyze the current situation regarding the inclusion of ethics instruction in all colleges and universities in the United States that have four-year aviation management degree programs. To cover key findings, first, current practices of aviation departments are reviewed. Next, the factors currently influencing the level of ethics inclusion in aviation curricula are discussed. Third, the author identifies factors that do not influence differentiation in the various levels of planned ethics inclusion in aviation curricula. Then, a number of recommendations for future progress and educational practice are made to

those interested in aviation management education. Finally, potential areas for future research are suggested.

A Summary Description of Current Practices

The literature review for this study revealed that nothing published was found concerning the inclusion of ethics education in curricula for aviation management students in four-year baccalaureate degree programs in the United States. It was suggested that this might indicate that not much is being done to bring the subject of ethics to the aviation management classroom. This suggestion was supported during this study. Although many assent to the importance of the subject, actual practice matches this uniform assent in just a few programs.

From reviews of efforts by non-aviation academic areas (principally law, medicine, business, and public administration), the author developed a construct called the EIS, which measures commitment of aviation management departments to include ethics in their curricula. Levels vary from 1 through 9 and correlate to descriptors of no ethics coverage to pervasive coverage. Level 9 is the desired level as established by the non-aviation fields that have been most successful in including ethics in their curricula (Culver et al. 1985; Link, 1989; Menkel-Meadow & Sander, 1995; Piper, Gentile & Parks, 1993; Weatherall, 1995). Of the 61 schools in the country offering aviation management as a major, 41 responded to this study, and statistical tests infer that these 41 represent the entire population. Despite the critical importance of ethics as an essential trait in aviation professionals, nearly half of the responding aviation management departments reported EIS levels of 3 or lower, meaning that, at best, an ethics course taught outside the aviation department is a possible elective class for students or that ethics is a planned subject in an aviation course primarily devoted to a topic other than ethics. Only five schools in this study have an EIS level of 9.

Combining the results of a written survey instrument with an extensive college catalog search, the author concluded that less than 25 percent of aviation departments require an ethics course and only 40 percent of those actually teach the course themselves. Most aviation departments delegate this responsibility to other departments at their universities, which reduces the potential impact of the course according to authors writing about ethics instruction in non-aviation academic areas (Bundy, 1995; Gilbert, 1992; Spaeth, Perry & Wachs, 1995). Several aviation departments that do require an ethics course and teach it internally are actually part of their universities' business schools. Because business schools are more likely to require ethics in their curricula, this means that the presence of ethics in aviation

departments might be even less evident if some aviation departments were completely independent.

An even more surprising statistic is the relatively low number of aviation departments offering courses having ethics as one pre-planned topic among many others for discussion. It must be emphasized that ethics problems are common in the industry and that some more notable problems have led to fatal aviation accidents. Knowing this, it seems obvious that students should be exposed to the subject at some point during college. Nevertheless, only 22 of 41 responding schools stated that they included ethics as a planned topic in any aviation courses.

Other indicators of the low priority given to ethics instruction exist. Few aviation professors actively teach the subject, and even fewer do any research in the area. Very few college catalogs mention ethics in aviation course descriptions. No one responding to or interviewed for this study was aware of any aviation-specific published materials that would help them bring ethics education to the aviation classroom. No responding departments had ever received any grants or gifts from within the university or from the aviation industry to develop an ethics component for their curricula.

Efforts to include ethics in aviation curricula are stagnant. It was found that not only is the level of ethics inclusion generally low in aviation school programs, but also that most department heads are content with the status quo. The department heads and professors interviewed in this study were knowledgeable of ethical lapses in industry based on their own industry experience. Although their current assessment of industry ethics was a little more clouded, present problems are not hidden from view. At the same time, not one of the department heads interviewed was part of the process that produced their schools' current level of ethics inclusion. Additionally, only one of the department heads interviewed had any current plans to change his school's baccalaureate degree program to include more ethics (a change to include more ethics in a department safety course). Thus, it appears that the level of planned inclusion of ethics in aviation curricula which now exists has existed for a while. Though change may be needed in light of industry problems and the correspondingly low coverage of the subject in academic programs, change does not appear to be forthcoming. There is no sense of urgency in the aviation education world to upgrade the content or manner of teaching ethics.

Before making recommendations to change this situation, one must consider this study's findings regarding factors that have influenced the degree to which aviation departments have already included ethics in their curricula. One should also ponder factors, which have not yet been influential, as lessons can be learned from them as well.

Factors Influencing Level of Ethics Inclusion

Part One explained a number of hypotheses that were investigated during this study regarding factors that influence the inclusion of ethics in academic curricula (Oderman, 2002). A survey instrument was sent to department heads of all collegiate aviation management programs in the country, and statistical tests were performed on data received to examine the hypotheses. The data produced a number of statistically significant findings indicating influential characteristics on a school's level of planned ethics inclusion.

Several factors revolve around the department head. As expected, institutions with heads that support decisions to incorporate ethics into the curricula are more likely to have higher levels of planned ethics inclusion. The same is true for institutions that have heads who have actually taught the subject of ethics at some point in the curriculum, as a required course, an elective course, or as a planned topic in another non-ethics specific aviation course.

Several other factors correlated with higher levels of planned ethics inclusion. Schools with faculty members who demonstrated an interest in teaching ethics are more likely to be on the upper end of the EIS. Universities with accreditation standards requiring an ethics component in their curricula are more likely to be on the upper end of the EIS. Colleges that hosted speakers or seminars on campus about ethics in the aviation industry are more likely to be those on the higher end of the EIS spectrum. In this last case it is possible that the driving variable could be either the guest speakers or the higher EIS level. That is, guest speakers from industry may have raised awareness of ethical issues to the point that more ethics education was added to the curriculum. Alternatively, a higher level of ethics inclusion may have led academic officials to host guest speakers from industry. Both could be true as they complement one another.

No other investigated variables were shown to influence a differentiation between levels of planned inclusion, but several variables do have some impact on particular methods for including ethics in the curriculum. The following variables have a direct correlation with aviation departments requiring students to take an ethics course taught by professors outside the aviation department:

1. Approval of decisions to support including ethics in the curriculum by the current department head.
2. Perception that lack of course materials is not an obstacle to teaching ethics.
3. Likelihood that a department does not have aviation faculty members interested in teaching ethics.

4. Requirement to include ethics somewhere in the department's program in order to meet accreditation standards.
5. Department head agreement with the statement that if ethics is taught, it should be taught outside the department.

The following variables directly related to aviation departments requiring students to take an ethics course taught by professors within the aviation department:

1. Aviation faculty members with a demonstrated interest in teaching ethics.
2. Willingness of department heads to fund training of faculty to teach ethics.
3. Willingness of department heads to fund efforts to advance ethics instruction in the department.
4. Importance placed by a department head on including ethics in the curriculum.
5. Department head agreement with the statement that if ethics is taught, it should be taught within the aviation department.
6. Lower student enrollment in the school's aviation department.

The following variables directly correlated with aviation departments allowing an ethics course taught by professors outside the aviation department to count as an elective course for graduation credit:

1. Previous approval of decisions to support including ethics in the curriculum by the current department head.
2. Department head disagreement with the statement that if ethics is taught, it should be taught from within the aviation department.

The following variables directly related to aviation departments teaching ethics as a planned topic in aviation courses whose principal subject matter is not ethics:

1. Approval of decisions to support including ethics in the curriculum by the current department head.
2. Department head himself or herself having taught ethics in the curriculum.
3. Perception by department heads that lack of trained faculty is not an obstacle to including ethics in aviation curricula.
4. Aviation faculty members with a demonstrated interest in teaching ethics.
5. Willingness of department heads to fund training of faculty to teach ethics.
6. Requirement to include ethics somewhere in a department's program in order to meet accreditation standards.
7. Hosting guest speakers and seminars on ethics in the industry.
8. Willingness of department heads to fund efforts to advance ethics instruction in the department.

Factors not Influencing Differentiation in Levels of Ethics Inclusion

On the surface, it seems obvious to say that any factors not mentioned in the preceding section would now be listed as those which do not influence how ethics is included in aviation management curricula. Yet, a cursory dismissal of these statistically non-significant factors should not be made because some of the factors about to be discussed are very likely influential but they influence all aviation departments regardless of EIS. Discussion is also needed because the literature review suggested that several of these non-influential factors would be influential. To merely dismiss them without comment could lead to neglecting some unique considerations within aviation management programs that might not be characteristic of the non-aviation curricular areas reviewed earlier.

The review of non-aviation curricular areas predicted that higher-level academic administration support would be an influential factor in the level of planned ethics inclusion. This study did not support this. The vast majority of department heads did not view a lack of higher-level support as an obstacle. At the same time though, in interviews with aviation department heads, none really had a clear picture of what higher-level administrators can do to actually support adding more ethics to the curricula. If these administrators took similar actions with regard to their aviation departments that other higher-level administrators took with regard to their business, law and medicine departments, significant backing might make a difference in an aviation department's ability to develop a pervasive ethics education package.

In Part One, several examples were documented of momentous actions taken by outside organizations, which assisted non-aviation curricular areas in establishing ethics instruction programs (Oderman, 2002). In this study of aviation departments, outside support was not shown to be an influential factor. The reason is clear. The only outside support received by aviation departments was hosting guest speakers on the subject of ethics in the industry. In the aviation world, there have been no outside grants of any size to fund initiation of an ethics education program. There have been no cooperative efforts between industry and academia to develop materials to be used at the collegiate level, nor have there been any funds for training faculty to teach the subject more effectively. Those aviation departments that are doing anything in this area either rely on extra-departmental expertise for teaching or they rely on aviation faculty who are using their own personal experience to bring ethics content to the curriculum.

Academic and industry experience levels of department heads are not influential in differentiating levels of ethics inclusion. Though experience levels in both areas vary widely, all department heads knew of multiple instances of unethical behavior and also knew of the pressures within the

industry that are a catalyst for unethical behavior. Thus, because all are on common ground, this is not a prevailing issue in determining level of planned inclusion. Nevertheless, knowledge of ethics in the industry is something that department heads cited as a reason for their current opinions regarding the inclusion of ethics in the curricula, so experience cannot be dismissed as non-influential.

Part One also suggested that three obstacles to offering ethics instruction exist: (a) lack of time in an already-packed curriculum; (b) lack of good course materials; and (c) lack of trained faculty (Oderman, 2002). Thus, it was expected that programs with a higher EIS would be less likely to perceive these as obstacles. This is not the case. Lack of time in the curriculum was the number one obstacle listed by department heads in written surveys and telephone interviews. This obstacle affects including ethics instruction regardless of a department's EIS. Though lack of good course materials was not as frequently mentioned as an obstacle, it too was cited across the board as problematic. It is interesting to note that departments that rely on outside departments to provide their ethics instruction do not regard course materials as a problem. Lack of trained faculty was cited as a common problem; however, this obstacle is present at all EIS levels. Regarding this point though, it is important to note that there is broad agreement across all EIS levels that faculty training should be done, though there is less agreement on the willingness of department heads to fund such training.

A final factor that was expected to influence differentiation in EIS, but did not, is school category. It appeared to be intuitively apparent that schools that are sponsored by religious organizations would have a higher EIS than secular private and public schools. Such is not the case, possibly because religiously sponsored institutions cover ethics in ways not documented in this study. Nevertheless, it seems that the recommendations about to be made apply to all colleges and universities regardless of their sponsoring and funding sources.

Recommendations for Future Progress and Practice

A number of recommendations logically emerge from this study. In light of the current state of affairs regarding including ethics in aviation curricula, the most important conclusion is that a sense of urgency needs to be created among aviation educators for advancing the level of ethics education at most schools offering aviation management as a major. Interested department heads and faculty should attempt to influence other aviation faculty. To do this, they must take initiative to do research, publish articles, and make presentations on the subject within the normal aviation-related academic forums available. Such efforts could lead to a wider

understanding of the problem, cooperative efforts within the aviation education community on dealing with the issue, and substantial efforts to improve pedagogy on the subject. Hopefully, this effort would demonstrate the critical importance of the subject and push it toward the top of the priority list. Though not eliminating the obstacle of lack of time in the curriculum, it might elevate ethics and, if necessary, push less important topics down the list of needed curricular subjects.

Second, aviation educators need to engage the resources of the aviation industry to develop cooperative programs to improve ethics education efforts. To begin this process, educators must show the industry that it needs ethical leaders and that efforts to bring ethics instruction to colleges can make a difference in the graduates that show up on industry's doorstep. If this can be done, industry may be willing to fund efforts to improve ethics instruction at the university level. Such funds could be used by the academic community to develop needed course materials that are aviation specific. Industry could help develop these materials. Individual companies could submit case studies of actual ethical problems with which they have dealt (sanitized if necessary). They could submit company codes of ethics as examples of industry standards that could be discussed in class and they could explain their own policies and experiences with company training programs on ethical issues. Perhaps some companies have developed successful internal programs that help employees deal with ethical issues and pressures. This expertise could be shared with academia with a view toward improving the educational methods used by aviation education departments.

As mentioned already, the development of course materials must be given priority. When talking about course materials used for teaching ethics at their schools, several department heads and professors made comments similar to the following paraphrase, "If someone writes a book on the subject, I will buy it." Teaching a subject is always a lot easier when one can begin with a good textbook. Most professors can take a well-referenced book and develop a thought-provoking course using it. To a certain extent this would alleviate the need for a lot of faculty training in this area. In addition to an entire textbook on the subject, it would be important to develop individual case studies on a variety of aviation subjects. Such cases could then be used in a variety of other aviation courses to discuss ethical issues. This would help aviation professors who do not teach a department's primary ethics course but nevertheless want to talk about how ethics applies to other aviation topics.

This study suggests that ethics is best taught pervasively. A required course in aviation ethics should be offered during the first two years of the aviation management curriculum. Furthermore, it is important for aviation departments to assume this teaching requirement themselves rather than requiring a course from another department on campus because it more

readily demonstrates the commitment of aviation professionals to ethics. The effectiveness of offering the required course early in a student's career has been shown in other curricular areas. Additionally, wherever possible, aviation departments should include ethics courses taught elsewhere on campus on the approved list of general education electives needed to complete aviation degree requirements. As a last segment of the pervasive approach, ethics should be included as a planned topic in all applicable aviation courses. Department heads should encourage this of all faculty members. However, faculty members should not be forced to cover the topic if they do not want to do so.

Establishing a pervasive program to teach ethics is a long-term project. As shown by Fullan and Stiegelbauer (1991), educational change is slow. Knowing this, the author suggests a sequenced phase-in of course offerings. First, add elective ethics courses taught outside the department to the general education requirements for aviation degrees. In this way, most schools could easily upgrade the ethics component of their curricula almost immediately. Second, add ethics as a planned topic to existing aviation courses whenever the content of such courses deals with issues relating to ethics. An example would be a safety course dealing with preventing accidents caused by human error when that error is a lapse in ethical judgment. This will get more aviation professors involved in the overall effort to incorporate ethics in the curriculum. As ethics is added to aviation courses, departments should also consider adding ethics to course catalog descriptions to document their commitment to this subject. Third, add a required aviation ethics course. This is obviously the most difficult task because it requires complete course development. During this entire process all faculty should model ethical behavior before students. Department heads should insist that all faculty act according to the highest ethical standards and that all department practices conform to and encourage such standards as well. A department code of ethics that is published and distributed to faculty and students would aid this effort.

Faculty training should be provided for those desiring it. On a spectrum ranking concreteness of subject matter content from explicit to ambiguous, most aviation subject matter is explicit with a specific way to do things. Checklists and precise regulations guide decisions and procedures. Thus, discussing ethics may induce a bit of fear and trepidation in the typical aviation professor because there is often ambiguity when talking about ethics. An aviation professor who knows his aviation subject matter enters class with a certain ease because of familiarity with the subject. Consequently, teaching ethics may be perceived to be more difficult, and in fact, it may actually be more difficult. Department heads should think creatively in this area and provide some kind of training for interested faculty members. To help alleviate apprehension, it may be useful for

aviation professors to audit other classes on campus that have ethical content. In this way, aviation faculty can get a better idea of how to teach such subject matter by watching others more experienced in this. Many schools have teaching seminars in which successful faculty members share their methods and experiences with other faculty in order to assist in faculty development.

Department heads can build the expertise of their faculty by holding seminars or discussions on the topic. Professors from other departments on campus who have specialized in the subject of ethics could be brought in to lead discussions on content or pedagogy. Representatives from industry could be brought in to discuss ethics from an industrial viewpoint. Interactive discussion on the subject will build expertise and provide experience in thinking through ethical issues.

One final recommendation deals with aviation accreditation. The Council on Aviation Accreditation (CAA) sets and publishes standards for accrediting aviation management degree programs in their Accreditation Standards Manual (CAA, 2001). Coverage of ethics is suggested but not mandated. To date, CAA accredits 18 of the colleges and universities that were part of this study, and one more is currently a candidate for accreditation (CAA, 2003). These schools represent some of the largest collegiate aviation education programs and are recognized as influential leaders in this area. If CAA were to mandate ethics instruction as one of their accreditation criteria, this would help establish the importance of ethics education and would set an example for the rest of the nation's aviation management institutions of higher learning.

POTENTIAL RESEARCH AREAS IN THE FUTURE

This research study was an exploratory study in the sense that no previous research had been done to describe the status of ethics education in aviation management baccalaureate degree programs. Because of its exploratory nature and due to the breadth of the subject area itself, much more research remains to be done.

First, this study did not go into any depth on pedagogy. Although the importance of incorporating ethics in the curriculum was demonstrated and the concept of offering ethics pervasively was established, nothing was said about content for such coursework nor was anything said about the best methods for teaching such courses. Examples from the literature review and this study point to methods like using case studies and teaching ethical principles and theory, yet actual course design and materials development would be an appropriate place to begin after reaching the conclusion of this report.

Second, although it was stressed that ethics belongs in the curriculum, nothing was said about how to fit it into the current curricula at each of the institutions offering aviation management. Each department will need to consider this topic individually because their curricula are all different and their current efforts to bring ethics education into their programs also vary.

Related to the pedagogical concerns is the issue of the generational differences between most of the current faculty and most of the current student population. Questions to be answered include the following. Is there a difference between generations on ethical issues? If so, what are they and how should this affect the way ethics is taught in the classroom? What barriers exist between faculty and students in discussing ethical issues? What methodology for teaching ethics best reaches the current generation of students? How should student background shape course content? Do students in aviation programs differ from their counterparts in other educational specialties? If so, does this influence how ethics is offered to aviation students?

Finally, there is still a question about the breadth and depth of faculty support for including ethics in the curriculum. This study was primarily aimed at department heads. As a result, data on faculty support was secondhand. To get a more complete assessment of faculty perspectives on this issue, a study designed to survey and interview faculty should be completed. This could add much light to all the matters discussed in this paper.

FINAL STATEMENT

Many issues have not been covered in this paper; however, some critically important points have been made. At this time, it is important to seize the initiative and act rather than ignore the problem and hope it will go away. Lacking complete research is not an excuse for inaction. Some people may be called to do further research. Some may be called to write or speak. Some may be called to initiate relationships with industry personnel. Others may be called to begin work on course development or course revision. Whatever the case may be, this author encourages everyone in the aviation education community to begin somewhere. It may require trial and error. It may result in taking one step back for every two steps forward. Nevertheless, begin. It is important.

REFERENCES

AirJet News. (2000, June 4). Untitled. Retrieved June 4, 2000, from http://airlinebiz.com/ main/wire06042000

Bundy, S.M. (1995). Ethics education in the first year: An experiment. *Law and Contemporary Society, 58,* 32-35.

Council on Aviation Accreditation. (2001, January). *Accreditation standards manual (CAA 101).* Auburn, AL.

Council on Aviation Accreditation. (2003). *Council on Aviation Accreditation.* Retrieved May 31, 2003, from http://www.caaaccreditation.org

Culver, C.M., Clouser, K.D., Gert, B., Brody, H., Fletcher, J., Jonsen, A., Kopelman, L., Lynn, J., Siegler, M., & Wikler, D. (1985). Basic curricular goals in medical ethics. *The New England Journal of Medicine, 312,* 253-256.

Fullan, M.G., & Stiegelbauer, S. (1991). *The new meaning of educational change.* New York: Teachers College Press.

Gilbert, J.T. (1992). Teaching business ethics: What, why, who, where, and when. *Journal of Education for Business, 68,* 5-8.

Leveque, R. (2003, February 15). *Airline employee charged with theft.* Retrieved February 18, 2003, from http://www.dailybulletin.com/Stories/0%2C1413%C203~21481~1181321%2C00.html

Link, D.T. (1989). The pervasive method of teaching ethics. *Journal of Legal Education, 39,* 485-489.

Loney, J. (1999, August 25). *Miami ramp rats bust shows airport vulnerability.* Retrieved August 26, 1999 from http://biz/yahoo.com/rf/990825/5j.html

Menkel-Meadow, C., & Sander, R.H. (1995). The "infusion" method at UCLA: Teaching ethics pervasively. *Law and Contemporary Society, 58,* 129-138.

Oderman, D.B. (2002). Ethics education in university aviation management programs in the US: Part One – The need. *Journal of Air Transportation, 7 (3),* 3-32.

Oderman, D.B. (2003a). Ethics education in university aviation management programs in the US: Part Two A – The current status. *Journal of Air Transportation, 8 (1),* 15-36.

Oderman, D.B. (2003b). Ethics education in university aviation management programs in the US: Part Two B – Statistical analysis of current practice. *Journal of Air Transportation, 8 (2),* 105-128.

Piper, T.R., Gentile, M.C., & Parks, S.D. (1993). *Can ethics be taught? Perspectives, challenges, and approaches at Harvard Business School.* Boston: Harvard Business School.

Skolnik, S. (2002, May 24). *Mechanic guilty of tampering with planes for more work.* Retrieved September 26, 2002, from http://seattlepi.nwsource.com/local/71739_trusty24.shtml

Spaeth, E.B., Jr., Perry, J.G., & Wachs, P.B. (1995). Teaching legal ethics: Exploring the continuum. *Law and Contemporary Society, 58,* 153-172.

Weatherall, D.J. (1995). Teaching ethics to medical students. *Journal of Medical Ethics, 21,* 133-134.

Wilson, C. (2000, March 27). *Airline, cargo handler pleads guilty.* Retrieved March 30, 2000 from http://dailynews.yahoo.com/h/ap/20000327/us/cargo_jet_crash_1.html

AIRLINE FLIGHT OPERATIONS INTERNSHIPS: PERSPECTIVES

Jose´ R. Ruiz
Southern Illinois University Carbondale
Carbondale, Illinois

ABSTRACT

The purpose of this study was to identify the manner in which former interns from multiple airlines perceived their airline flight operations internship experience and its value in the pursuit of career goals. The population was composed of former interns from the Southern Illinois University Carbondale (SIUC) Aviation Management and Flight (AVMAF) program. A Likert scale questionnaire was used in the study. Descriptive statistical methods and Kruskal-Wallis tests were used to analyze the data. Results of the study indicate that respondents perceived their airline flight operations internship to be a positive experience with significant value in the pursuit of career goals. There were no statistically significant differences ($p < .05$) in the manner in which respondents from different airlines perceived their airline flight operations internship experience.

INTRODUCTION

Collegiate aviation flight programs prepare students for careers as professional pilots. Curricula vary, but the majority of collegiate aviation flight programs require students to possess at least a commercial pilot certificate and an instrument rating prior to graduation. Graduates are qualified for employment as commercial pilots; however, many students choose to participate in an airline flight operations internship program in an attempt to gain experience and added leverage in a difficult employment market.

Collegiate aviation institutions throughout the U.S. have been involved in airline flight operations internship programs for over 20 years. "Major U.S. airlines and aviation-oriented universities have worked together on flight-oriented internship programs for over 15 years. For example, the

Jose´ R. Ruiz possesses a Ph.D. in Workforce Education and Development from Southern Illinois University Carbondale, and a Master of Aeronautical Science degree from Embry-Riddle Aeronautical University. He is an Associate Professor in the Department of Aviation Management and Flight at Southern Illinois University Carbondale. Professor Ruiz is also the airline flight operations internship coordinator for Southern Illinois University.

FedEx internship program dates back to the early 1980s" (NewMyer, Ruiz & Rogers, 2000, p. 1).

The advantages associated with internships are well documented. A study conducted by Kiteley (1997) mentions several of the advantages students and employers can expect to realize through participation in an internship program. "Employers gain access to committed, knowledgeable, temporary, and low-cost help, plus an opportunity to groom potential full-time employees. The participating students get a unique opportunity to experience the real world in their chosen profession" (p. 1).

Recognizing the potential benefits associated with these industry partnerships, many collegiate aviation programs throughout the country maintain internship agreements with at least one U.S. domestic air carrier. "According to the University Aviation Association, students can choose [an airline flight operations internship] from among more than 270 two- or four-year accredited aviation colleges or universities" (Phillips, 1996, p. 43).

This study explores the manner in which students from one university airline flight operations internship program perceived the internship experience.

Southern Illinois University Carbondale

The Aviation Management and Flight (AVMAF) Department of Southern Illinois University Carbondale (SIUC) has administered an airline flight operations internship program since 1987. At the time of this study, the SIUC AVMAF department maintained formal airline flight operations internship agreements with six U.S. major domestic air carriers: American Airlines, Delta Air Lines, Northwest Airlines, Trans World Airlines LLC, United Airlines, and United Parcel Service. A formal airline flight operations internship agreement also existed between the SIUC AVMAF department and Chicago Express Airlines, a U.S. regional carrier serving the Midwest.

PURPOSE OF THE STUDY

The purpose of this study was to identify the manner in which former interns from multiple airlines perceived the airline flight operations internship experience and the internship's value in the pursuit of career goals.

METHODOLOGY

The population for this study included SIUC AVMAF students who completed airline flight operations internships from July 1987 through May 2002 with at least one of seven U.S. air carriers that maintained a formal airline flight operations internship agreement with SIUC. The SIUC

AVMAF department and airline internship partners performed a records review and identified 224 students who met the population criteria. Of these, 23 interns served with American Airlines, 9 with Chicago Express Airlines, 20 with Delta Air Lines, 8 with Northwest Airlines, 23 with Trans World Airlines, 136 with United Airlines, and 13 with United Parcel Service. Eight interns served on multiple (two) internships.

A total of 218 intern addresses were obtained from the SIUC Alumni Association and SIUC AVMAF internship records. Addresses for six former interns who served at United Airlines were not available. A total of 226 survey questionnaires were mailed to 218 former interns. Eight of the former interns attended multiple (two) internships and, therefore, received two questionnaires. Two mailings of the survey questionnaire were conducted over a three-month period. The first and second mailings of the survey questionnaire resulted in the receipt of 150 survey questionnaire responses, a response rate of 66.4 percent.

Survey Questionnaire

The survey questionnaire was designed to elicit opinions related to two themes with two separate underlying constructs. The first theme dealt with identifying the role an airline flight operations internship was perceived to play in the pursuit of career goals. Ten of the 16 statements were designed to gather data needed to make that determination. This set of statements was referred to as the *career goals* set of statements. The second theme dealt with assessing overall impressions former interns had toward their internship experience. Six of the 16 statements were designed to gather data needed to make that determination. This set of statements was referred to as the *perceptions* set of statements. The 16 questionnaire statements were composed of 8 positively phrased statements and 8 opposing, negatively phrased statements. A Likert scale was used to determine the level of agreement or disagreement former interns had with both sets of statements. Values used in the survey questionnaire were: "Strongly Agree" = 5, "Agree" = 4, "Undecided" = 3, "Disagree" = 2, and "Strongly Disagree" = 1 for positively phrased statements; and "Strongly Agree" = 1, "Agree" = 2, "Undecided" = 3, "Disagree" = 4, and "Strongly Disagree" = 5 for opposing, negatively phrased statements.

A panel of experts was formed to assist in gauging survey validity. A pilot study of the survey questionnaire was also conducted by 20 former interns to increase the survey's content validity. The incorporation of suggestions provided by the panel of experts and former interns who participated in the pilot study led to the development of the final survey questionnaire. As stated by Best & Kahn (1998) "In general, a test is valid if it measures what it claims to measure" (p. 281).

A Cronbach Alpha coefficient was calculated for both sets of statements in the survey questionnaire, involving all 150 respondents, to gauge survey questionnaire reliability. A Cronbach Alpha reliability coefficient of r = 0.84 was calculated for the 10 career goals statements. A Cronbach Alpha reliability coefficient of r = 0.80 was calculated for the six perceptions statements. "The higher the score, the more reliable the generated scale is. Nunnaly (1978) has indicated .70 to be an acceptable reliability coefficient but lower thresholds are sometimes used in the literature" (Santos, 1999, p. 2).

Experiential Learning

The introduction of work experience (experiential learning) in post-secondary education is credited to Herman Schneider. He instituted the first cooperative education program at the University of Cincinnati in 1906 (Wilkins, 1987) as an experiment to "extend the college laboratory" (Van der Vorm & Jones, 1985, p. 1). This educational concept tripled in size in one decade and is currently offered at approximately 900 junior and community colleges, senior colleges, and graduate schools in the U.S.

In Shaping the College Experience, Scannell and Simpson (1996) cite John Dewey's attitudes toward experiential learning. "Dewey noted that building on the interest of students, relating what is done in school to what is done outside and attaining constant interaction with the wider community, brings value and purpose to what goes on in the classroom" (p. 13).

Throughout the book Internship Success, Green (1997) discussed the inherent value associated with internships and the positive influence they can have on career success. Green exclaimed, "The word is out that internships offer high school and college students a foolproof way to get a head start in the search for employment and career success" (p. xi).

Green also discusses the characteristics of cooperative education and internships in a detailed, comprehensive manner.

1. Internship: This term is often used generically to refer to any temporary work experience, in a for-profit or nonprofit setting, with the dual purpose of learning while working. Internships can be integrated with the student's regular school schedule, or take place during a semester away from school, or during the summer break. They can involve academic credit or remuneration. Some internships have an academic component and a faculty sponsor. Internship models may vary from school to school and even among departments on campus. Terminology may also vary: *Internship* may be used interchangeably with *field experience* or *co-op* to describe programs that look similar, or strikingly different (p. 10-11).

2. Cooperative Education (co-op): Derived from a relationship of cooperation between school and employer, co-op can refer to an institutional mandatory program or to a departmental elective program. In the majority of co-op programs, students work full-time for pay in business or industry partnerships for one or more semesters, alternating with full-time classroom study. Other types of co-op programs run parallel to regular academic schedules and carry academic credit. In some cases, college graduation must be extended beyond the typical four years to accommodate time spent on the job. Historically, only departments of engineering, business, and science sponsored co-op programs, but today co-op has become a popular option in many other departments as well (p. 11-12).

In Shaping the College Experience, Scannell and Simpson (1996) expressed their views on the relative worth of internships, as well as, citing characteristics associated with successful internships.

Educational benefits of internships have long been noted to encourage more understanding, interests and participation in government and other civic-minded activities; to observe knowledge of relationships between theory and practice. Successful internships are often based in and administered by academic departments, strongly supported centrally with requirements linked to the academic enterprise (p. 18).

Scannell and Simpson also stated that the primary shortcoming related to experiential education cited by traditional academicians is the lack of scientific data associated with experiential learning and the manner in which it benefits student learning.

In order for experiential education to pass the traditional academic muster of the faculty, substantiation of its intellectual benefit is a must. One of the ongoing criticisms of experiential education has been the paucity of any scientifically documented outcomes of the benefits of these opportunities as enhancements to student learning (p.14).

Airline Flight Operations Internships

Airline flight operations internship programs provide students the opportunity to experience the airline environment for a pre-determined period of time (typically one academic semester) at an off-campus location for academic credit. Qualifications vary, but the majority of airline flight operations internship programs require students to possess at least a private pilot certificate. While on the internship, students are expected to perform a variety of administrative support functions. However, interns are also exposed to the varied operational and support functions associated with an airline.

Phillips (1996) discussed airline internship programs at United, Delta, TWA, USAir, and FEDEX. The article mentioned numerous benefits associated with these internships, including: a) full-time employment at United and FEDEX; b) potential for being hired at Delta; c) aircraft simulator time; d) travel benefits; and e) jump seat flights or Additional Crewmember (ACM) privileges.

Simply stated, an internship or cooperative education program (co-op) is an opportunity for a college student to combine traditional on-campus academic learning with professional work experience in a chosen field. These programs allow students in a large number of collegiate aviation programs to bridge the gap between the classroom and the real world. (p. 44)

Bradley (1997) noted, "One of the keys for bridging the experience gap among young pilots is to develop closer cooperation between industry and schools, including establishing internship and work/educational cooperatives" (p. 80).

In an article by NewMyer (1991), he reported that three airlines—United, Northwest and Eastern—had a total of six university or community college partners including three airline-university intern agreements. It was noted that these partnerships were a response to "...the airline industry's search for an answer to the need for qualified, quality pilots..." (p. 16).

In a presentation that addressed airline flight operations internship benefits conducted at Concordia University Ruiz (2001) quoted a statement made by the United Airlines flight operations internship program director at that time.

Internships are a phenomenal opportunity for a job interview. Interns are not competing with the other 9000 applicants—they can move into the flight deck five years earlier than non-interns, resulting in an additional $7 - $7.5 million in career earnings (p.22).

Airline Perceptions of Internships

In a study conducted by NewMyer, Ruiz & Rogers (2000), 12 major airline flight operations internship coordinators were asked to summarize their attitudes toward internships.

As far as the value of the internship to the airline, it was interesting that 7 of the 12 airlines [contacted] mentioned "enthusiasm" as one of the things that interns bring to the airline. Several airlines put it this way: "They bring enthusiasm! A shot of energy! Enthusiasm and hard work–it's a trade off, we (the airline) get some hard work and fresh ideas in exchange for what we give to the interns." Another airline mentioned that in addition to enthusiasm, interns are a "morale booster" to regular airline employees (p. 122).

One of the strongest statements in support of airline flight operations internships is the opening statement in the internship program guidelines for Southwest Airlines.

Southwest Airlines recognizes the importance and benefits of an official, company-wide internship program. By having young, talented and educated people from the aviation community come work for us; Southwest will be more efficient and productive than ever. In return, the interns will gain hands-on experience in the day-to-day operations of an airline (Self, 1996, p. 1).

In a series of telephone interviews conducted by the researcher, key airline representatives involved in managing or participating in the flight operations internship program at their respective airline were asked to summarize their thoughts related to the value of an airline flight operations internship.

A. Ballon (personal communications, March 8, 2002), U.S. Airways Human Resources, Flight Operations Internship Coordinator, felt very strongly of the value associated with a flight operations internship.

Interns are extremely valuable to our operation at U.S. Airways. We have a great rapport with our interns; they are dedicated, competent-invaluable! While at U.S. Airways, students have access to our full-motion simulators; they network with seasoned pilots and perform cutting-edge projects for the airline. Interns become familiar with the dynamic of an airline. This is a small industry, if an intern establishes a good reputation with an airline, that reputation will follow them throughout the industry, increasing the likelihood that they will be employed by an airline.

D. Parker (personal communications, March 8, 2002), United Parcel Service (UPS) 727 Ground School Supervisor felt that the internship program was valuable for both the student and the airline.

We have the opportunity to work with the brightest students in [collegiate] aviation. Our interns are trained and qualified to develop sophisticated training aids. We invest quite a bit of money in our interns, but we receive a great return on our investment. We may not guarantee our interns an interview like other airline do, but if an intern does a good job for me – when he's ready, I will personally go to Human Resources and tell them that we need to interview this guy! Now that's an advantage toward achieving your career goals!

Respondent Employment Data

Of the total 150 responses, 144 respondents (96.0%) indicated that they are employed in aviation professions, while 6 (4%) indicated that they are employed in non-aviation professions.

Of the total 150 respondents, 137 (91.0%) are employed as pilots by a regional airline (36.7%), a major airline (33.3%), a corporate entity (9.5%), a flight school (17.7%), or the military (2.8%).

United Airlines employs 37 of the 49 respondents (75.5%) flying for a major airline. Other major airlines combined employ 12 respondents (24.4%). Of the 37 respondents hired as pilots by United, 36 of the respondents (97.2%) interned with United. Of the remaining 12 respondents hired as pilots by various other major airlines, 1 interned with UPS, 2 interned with TWA, 3 interned with Delta, and 6 interned with United.

RESULTS OF THE STUDY

Career Goals Statements

The following analysis of the ten career goals statements was conducted to identify the role an airline flight operations internship was perceived to play in the pursuit of career goals. The data are discussed in sets of positively worded and opposing, negatively worded statements. The descriptive statistical analysis data are presented in Table 1.

Positively worded statements

There were 128 respondents (85.3%) who agreed or strongly agreed with the statement, "My airline internship experience has proven to be a valuable asset in pursuing my career goals." This statement had a mean of 4.31, approaching strong agreement with the statement. It also had a standard deviation of 1.00, indicating that responses to this statement were not widely dispersed.

There were 128 respondents (80.0%) who agreed or strongly agreed with the statement, "My airline internship experience allowed me to network and form professional relationships that have assisted me in pursuing my career goals." This statement had a mean of 4.05, indicating agreement with the statement. It also had a standard deviation of 1.01, indicating that responses to this statement were not widely dispersed.

There were 118 respondents (78.6%) who agreed or strongly agreed with the statement, "My airline experience assisted me in formulating my career goals." This statement had a mean of 4.02, indicating agreement with the statement. It also had a standard deviation of 1.01, indicating that responses to this statement were not widely dispersed.

There were 90 respondents (60.0%) who agreed or strongly agreed with the statement, "My airline internship experience aided me in acquiring my initial employment." This statement had a mean of 3.62, indicating that respondents approached agreement with the statement. It also had a standard deviation of 1.45, indicating that responses to this statement varied more

than responses to other statements. Notably, 42 respondents (28.0%) also disagreed or strongly disagreed with this statement, indicating some measure of dissention related to the role an airline internship is perceived to play in the acquisition of initial employment.

There were 81 respondents (54.0%) who agreed or strongly agreed with the statement, "My airline internship experience aided me in acquiring my current employment." This statement had a mean of 3.39, indicating that respondents' perceptions varied between being undecided and approaching agreement with the statement. It also had a standard deviation of 1.53, indicating that responses to this statement varied more than responses to other statements. Notably, 55 respondents (36.6%) also disagreed or strongly disagreed with this statement, indicating some measure of dissention related to the role an airline internship is perceived to play in the acquisition of current employment.

Negatively worded statements

There were 129 respondents (86.0%) who disagreed or strongly disagreed with the statement, "My airline internship experience has proven to be of little value in the pursuit of my career goals." This statement had a mean of 4.39, approaching strong disagreement with the statement, indicating that an airline internship is considered valuable in the pursuit of career goals. It also had a standard deviation of 1.05, indicating that responses to this statement were not widely dispersed. There were 128 respondents (85.4%) who disagreed or strongly disagreed with the statement, "My airline internship experience had little to do with the formulation of my career goals." This statement had a mean of 4.17, approaching strong disagreement with the statement, indicating that an airline internship is considered valuable in the pursuit of career goals. It also had a standard deviation of 0.96, indicating that responses to this statement were not widely dispersed.

There were 113 respondents (86.0%) who disagreed or strongly disagreed with the statement, "My airline internship experience resulted in few professional networking opportunities." This statement had a mean of 3.91, approaching disagreement with the statement, indicating that an airline internship is considered valuable in the pursuit of career goals. It also had a standard deviation of 1.12, indicating that responses to this statement were not widely dispersed.

There were 74 respondents (49.4%) who disagreed or strongly disagreed with the statement, "My airline internship experience played an insignificant role in acquiring my current employment." This statement had a mean of 3.17, indicating that respondents' perceptions varied between being undecided and approaching disagreement with the statement. It also had a

standard deviation of 1.52, indicating that responses to this statement varied more than responses to other statements. Notably, 66 respondents (44.0%) also agreed or strongly agreed with this statement, indicating some measure of dissention related to the role an airline internship is perceived to play in the acquisition of current employment.

There were 70 respondents (46.7%) who disagreed or strongly disagreed with the statement, "My airline internship experience played an insignificant role in acquiring my initial employment." This statement had a mean of 3.15, indicating that respondents' perceptions varied between being undecided and approaching disagreement with the statement. It also had a standard deviation of 1.54, indicating that responses to this statement varied more than responses to other statements. Notably, 64 respondents (42.6%) also agreed or strongly agreed with this statement, indicating some measure of dissention related to the role an airline internship is perceived to play in the acquisition of initial employment.

Perceptions Statements

The following analysis of the six perceptions statements was conducted to assess the overall manner in which former interns perceived their airline flight operations internship experience. The data are discussed in sets of positively worded and opposing, negatively worded statements. The data are presented in Table 1.

Positively worded statements

There were 141 respondents (94.0%) who agreed or strongly agreed with the statement, "My airline internship experience was very educational." This statement had a mean of 4.47, approaching strong agreement with the statement. It also had a standard deviation of 0.72, indicating that responses to this statement were not widely dispersed.

There were 145 respondents (96.7%) who agreed or strongly agreed with the statement, "I would recommend participating in an airline internship to someone else." This statement had a mean of 4.73, approaching strong agreement with the statement. It also had a standard deviation of 0.56, indicating that responses to this statement were not widely dispersed.

Table 1. Perceptions of airline flight operations internship experiences and their value in the pursuit of career goals

Questionnaire Statement	*Mean*	*SD*	#	%
Positively worded career goal statements				
My airline internship experience has proven to be a valuable asset in pursing my career goals	4.31	1.00	128*	85.3
My airline internship experience allowed me to network and form professional relationships that have assisted me in pursuing my career goals	4.05	1.01	12.*	80.0
My airline internship experience assisted me in formulating my career goals	4.02	1.01	118*	78.6
My airline internship experience aided me in acquiring my initial employment	3.62	1.456	90*	60.0
My airline internship experience aided me in acquiring my current employment	3.39	1.53	81*	54.0
Negatively worded career goal statements				
My airline internship experience has proven to be of little value in the pursuit of my career goals	4.39	1.05	129**	86.00
My airline internship experience had little to do with the formulation of my career goals.	4.17	0.96	128**	85.4
My airline internship experience resulted in a few professional networking opportunities.	3.91	1.12	113**	86.0
My airline internship experience played an insignificant role in acquiring my current employment.	3.17	1.52	74**	49.4
My airline internship experience played an insignificant role in acquiring my initial employment	31.5	1.54	70**	46.7
Positively worded perceptions statements				
My airline internship experience was very educational.	4.47	0.72	141*	94.0
I would recommend participating in an airline internship to someone else.	4.73	0.56	145*	96.7
My airline internship experience significantly increased my knowledge of the airline industry.	4.27	0.87	131*	96.7
Negatively worded perceptions statements				
My airline internship experience was less educational that I had hoped.	4.17	0.93	130**	86.7
My knowledge of the airline industry was less extensive than I thought it would be after having completed an airline internship.	4.02	0.99	119**	79.3
I am unwilling to recommend participating in an airline internship to someone else.	4.52	0.93	138**	92.0

N = 150 for each statement

*Respondents who indicated they "Agree" or "Strongly Agree" with the statement.

**Respondents who indicated they "Disagree" or "Strongly Disagree" with the statement.

There were 136 respondents (87.3%) who agreed or strongly agreed with the statement, "My airline internship experience significantly increased my knowledge of the airline industry." This statement had a mean of 4.27, approaching strong agreement with the statement. It also had a standard deviation of 0.87, indicating that responses to this statement were not widely dispersed.

Negatively worded statements

There were 136 respondents (86.7%) who disagreed or strongly disagreed with the statement, "My airline internship experience was less educational than I had hoped." This statement had a mean of 4.17, approaching strong disagreement with the statement, indicating that respondents' perceived an airline internship as educational. It also had a standard deviation of 0.93, indicating that responses to this statement were not widely dispersed.

There were 119 respondents (79.3%) who disagreed or strongly disagreed with the statement, "My knowledge of the airline industry was less extensive than I thought it would be after having completed an airline internship." This statement had a mean of 4.02, indicating disagreement with the statement and signifying that respondents' perceived an airline internship as serving to enhance an intern's knowledge of the airline industry. It also had a standard deviation of 0.99, indicating that responses to this statement were not widely dispersed. There were 16 respondents (10.7%) who agreed or disagreed with the statement and 15 respondents (10.9%) were undecided with the statement.

There were 138 respondents (92.0%) who disagreed or strongly disagreed with the statement, "I am unwilling to recommend participating in an airline internship to someone else." This statement had a mean of 4.52, approaching strong disagreement with the statement, and indicating that respondents would recommend an airline internship to someone else. It also had a standard deviation of 0.93, indicating that responses to this statement were not widely dispersed.

Statistically Significant Differences

A Kruskal-Wallis test was conducted to identify statistically significant differences in the manner in which respondents from different airlines perceived the role an airline flight operations internship played in the pursuit of career goals. After applying a Kruskal-Wallis test of significance, no statistically significant difference in responses were found among airlines at the $p < .05$ level, [X^2 (6, N = 150) = 7.70, p = .26].

A Kruskal-Wallis test was conducted to identify statistically significant differences in the manner in which respondents from different airlines

perceived their airline flight operations internship experience. After applying a Kruskal-Wallis test of significance, no statistically significant difference in responses were found among airlines at the $p < .05$ level, [X^2 (6, N = 150) = 3.88, p = .69].

CONCLUSIONS

Generally, respondents held a positive view of their internship experience. The majority of respondents (94.0%) felt that the internship experience was educational. The majority of respondents (87.3%) indicated that the internship experience significantly increased their knowledge of the airline industry. The majority of respondents (96.7%) expressed that they would recommend an airline internship to someone else.

An airline flight operations internship was perceived to play a significant role in the pursuit of career goals. The majority of respondents (85.3%) perceived the internship experience to be a valuable asset in the pursuit of their career goals. The majority of respondents (78.6%) believed the internship experience assisted them in the formulation of their career goals. The majority of respondents (80.0%) also reported that their internship experience allowed them the opportunity to form professional relationships that had assisted them in pursuing their career goals.

The majority of respondents (60.0%) reported that their internship experience aided in acquiring initial employment. However, respondents (40.0%) also reported that they were undecided or did not believe their internship experience aided them in acquiring initial employment. The majority of respondents (54.0%) reported that their internship experience aided in acquiring current employment. However, respondents (46.0%) also reported that they were undecided or did not believe their internship experience aided them in acquiring current employment.

There were no statistically significant differences ($p < .05$) in the manner in which respondents from different airlines perceived the role an airline flight operations internship played in the pursuit of career goals ($p = .26$).

There were no statistically significant differences ($p < .05$) in the manner in which respondents from different airlines perceived their airline flight operations internship experience ($p = .69$).

This study has served to report the manner in which former interns perceive the airline flight operations experience. Generally, the experience was perceived to be positive and valuable in the pursuit of career goals. There were no significant differences in the manner in which the internship experience was perceived among respondents from different airlines.

REFERENCES

Best, J.W., & Kahn, J.V. (1998). *Research in education* (8th ed.). Needham Heights, MA: Allyn-Bacon.

Bradley, P. (1997, September). Is the pilot shortage coming? *Business and Commercial Aviation*. 78-80.

Green, M.E. (1997). *Internship success*. Chicago, IL: VGM Career Horizons.

Kiteley, G.W. (1997, November). *Aviation industry and college partnerships in the United States*. Auburn, AL: University Aviation Association.

NewMyer, D. A. (1991). Status Report: An Airline-University Cooperative Pilot Career Program. *Collegiate Aviation Review*, 15-22.

NewMyer, D.A., Ruiz, J.R., & Rogers (2000). University flight operations internships with major airlines: Airline perspectives. *The Journal of Air Transportation World Wide, 5*(2), 111-129.

Phillips, W. (1996, November). Internships and coops: Collegiate programs that can make your career take off. *Flight Training*, 43-47.

Ruiz, J.R. (2001). Collegiate aviation internships with U.S. major airlines: A changing climate. Paper presented to the Aviation Management Education and Research Conference. Abstract retrieved August 15, 2001 from http://www.johnmolson.concordia.ca/amerc

Santos, J. R. A. (1999). Cronbach's alpha: A tool for assessing the reliability of scales. *Journal of Extension. 37* (2), 1-5.

Scannell, J., & Simpson, K. (1996). *Shaping the college experience outside the classroom*. Rochester, NY: The University of Rochester Press.

Self, B. (1996, September). Southwest airlines internship program guidelines. Dallas, TX: Southwest Airlines.

Van der Vorm, P.T., & Jones, N.R. (1985). *Cooperative education across disciplines*. Lahnam, MD: University Press of America.

Wilkins, J.E. (1987). Factors influencing student participation in cooperative education programs at selected post secondary institutions. *Dissertation Abstracts International*. (UMI NO. 881649)

APPLYING DATA MINING TECHNIQUES TO FORECAST NUMBER OF AIRLINE PASSENGERS IN SAUDI ARABIA (DOMESTIC AND INTERNATIONAL TRAVELS)

Abdullah Omer BaFail
King Abdul Aziz University
Jeddah, Saudi Arabia

ABSTRACT

This work involves forecasting the number of domestic and international airline passengers in Saudi Arabia. The method used is the neural network technique. Annual data 1975 to 1986 was used and categorized into 16 variables. The forecast was obtained using the Model Quest Miner package, which uses some historical data for developing the model then proceeds to an evaluation phase. The period used for developing the model for the number of passengers was 18 years, while the period used for evaluation was 6 years. Samples of output are presented for each model. Plots of forecasts versus the actual number are shown, together with the percentage of trend fit. Results indicated that the oil gross domestic product, population size and per capita income were found to be the most contributing variables that affect the number of passengers in the Saudi Arabian airline sectors.

INTRODUCTION

Fortunately the Kingdom of Saudi Arabia is endowed with numerous natural opportunities for air travel because of its geographical location, being the site of the two holy mosques, its vast land area spreading from Showrorah in the south to Tabouk in the north, its rapid development in all spheres of life and its friendly relations with world community.

Abdullah Omer BaFail graduated in Systems Engineering from King Fahad University of Petroleum and Minerals, Dammam, Saudi Arabia in 1979. He joined the Department of Industrial Engineering, King Abdul Aziz University Jeddah in 1979 as a Graduate Assistant. He took his Masters degree in Industrial and Systems Engineering at University of Colorado in 1982. In 1989 took his Ph.D. in Industrial and Systems Engineering from Arizona State University. He was promoted to the post of Assistant Professor in 1989 and then in 1997 as Associate Professor. Currently he is the Chairman of the Department of Industrial Engineering. He has to his credit more than 15 papers published in international and national journals and conferences. He has several ongoing consultancy projects with the Government and some major private industrial firms in Saudi Arabia.

Air transportation in the Kingdom has undergone considerable expansions and developments during the past years. There are 25 international and domestic airports. The number of passengers (arriving & departing) handled by all airports increased at an average annual rate of 15%, rising from 1.6 million in 1970 to 30 million in 1998.

The Saudi Arabian Airlines (Saudia) took the operational responsibility to run the air transportation business in the Kingdom, and has made a vital contribution to the development of the Kingdom (A Brief Outline, 1990; Update Forecast, 1979). Saudia is constantly endeavoring to innovate, and to plan ahead for improved service to customers. One of the improvements to the current business is forecasting and analyzing the air travel market.

The main objective of this paper is to develop a forecasting model to forecast the number of airline passengers (international and domestic) in five major cities in Saudi Arabia. The cities considered for the study are Riyadh, Jeddah, Madina, Dhahran, and Taif. The methodology follows artificial neural network, using the Model Quest Minor package. The next section explains air travel market analysis, followed by an analysis of the forecasting methodology, the data analysis and conclusions.

AIR TRAVEL MARKET ANALYSIS

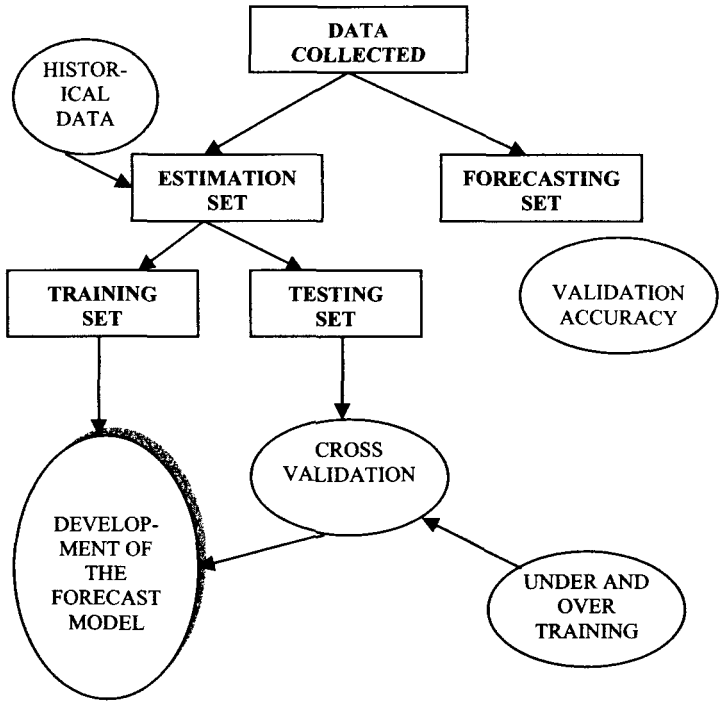
Information relevant to the characteristics of the relationship among the air travel growth factors enabled the author to make a list of 16 variables which might influence the air travel demand for domestic and international travel (International, 1994). This list is as follows:

1. Oil Gross Domestic Product (Oil - GDP)
2. Private Non-Oil Gross Domestic Product (P-S)
3. Government Non-Oil Gross Domestic Product (G-S)
4. Total Non-Oil Gross Domestic Product (YND-G)
5. Total Gross Domestic Product (T-G)
6. Consumer Price Index (CPI)
7. Per Capita Income (PERC- IN)
8. Import of Goods and Services (IGS)
9. Exchange Rate (Saudi Riyals /U)
10. Population Size (P- Size)
11. Total Expenditures (T - Exp)
12. Private Consumption Expenditures (PFC-EXP)
13. Government Consumption Expenditures (GFC-EXP)
14. City Domestic (City-DOM)
15. City International (City- INT)
16. Year

The historical data in terms of real prices (in Million Saudi Riyals) of the above variables against the years covering the period 1975 to 1998 are

published in a paper by Khalid Al-Bassam (1997). This historical data is called the estimation set. In this study, a fraction of the overall available data is reserved for validating the accuracy of the developed forecast model. This reserved data set is called the forecasting set because no information contained in it is used in any form during the development of the forecast model. The data in the forecasting set are used for testing the true extrapolative properties of the developed forecast model. The estimation set is further divided into a training set and a testing set. Information in the training set is used directly for the determination of the forecast model, whereas information in the testing set is used indirectly for the same purpose. In particular, information in the testing set is used for out-of-sample testing, that is, for cross-validation, allowing prevention of under-training (under-fitting) and over-training (over-fitting). Prevention of under-training and over-training is crucial in the development of a forecast model which extrapolates well beyond the estimation set. Figure 1 presents the model development schematically.

Figure 1. Schematic representation of forecast model development.



FORECASTING METHODOLOGY

By the simplest definition data mining is an attempt to find patterns in data. There are many different methodologies to data mining such as cluster analysis, decision trees, categorization analysis, visualization, time series analysis, hybrid approaches, linkage analysis, and neural network (Update Forecast, 1979). In this study, neural network architecture will be used.

Neural Network Architecture

A neural network is a software (or hardware) simulation of a biological brain (sometimes called an artificial neural network or ANN). The purpose of a neural network is to learn to recognize patterns in a given data. Once the neural network has been trained on samples of the given data, it can make predictions by detecting similar patterns in future data. Software that learns is truly artificial intelligence.

Neural networks are able to detect similarities in inputs, even though a particular input may never have been seen previously. This property allows for excellent interpolation capabilities, especially when the input data is noisy (not exact). Neural networks may be used as a direct substitute for autocorrelation, multivariable regression, linear regression, trigonometric and other regression techniques.

Neural networks are often pictured as layers of functional nodes. The most general form of a neural network model used in forecasting can be written as:

$$Y = F\,[H1\,(x), H2\,(x), \ldots., Hn\,(x)] + u$$

Where, Y is a dependent variable, X is a set of explanatory variables, F & H's are network functions, and u is a model error term.

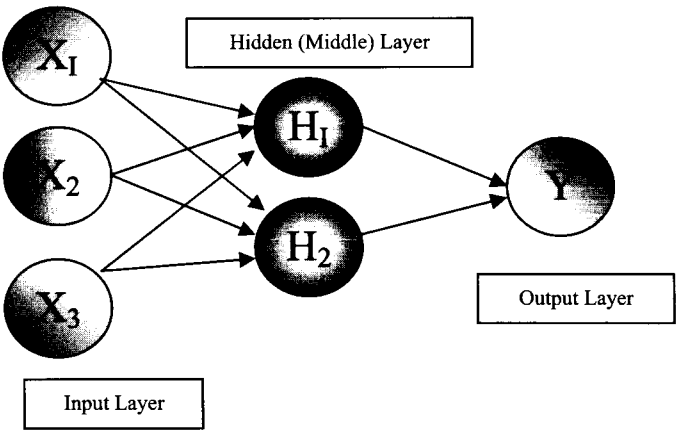
Figure 2 shows a typical 3-layer back propagation network: an input layer, a hidden layer, and an output layer. Layer 1, the Xs, is called the input layer. The input layer is configured such that current and past values of the indicators (inputs) and of the forecasted variables (outputs) can be utilized (Barla, 1999). This input layer is connected to a hidden layer 2. Hs are the hidden layer activation functions. Each hidden layer has a collection of processing elements called nodes, which represents a different nonlinear function. Each node in a layer receives its input from the preceding layer through link elements called weights. The weights, along with the bias, are the free parameters of the model structure which must be adjusted using an appropriate learning algorithm and the information contained in the training set. Finally, layer 3, the Ys, is the output layer, which takes the intermediate results from the hidden layer and computes a prediction. In practice, the

number of layers, number of nodes, and specific functional form in each layer must be determined by pragmatic experimentation.

Artificial Neural Network Learning Algorithm

For a given ANN architecture and a training set, the basic mechanism behind most supervised learning rules is the updating of the weights and the bias terms, until the mean squared error (MSE) between the output predicted by the network and the desired output (the target) is less than a pre-specified tolerance. The method used to compute these weights is the Adaptive Back Propagation (ABP) algorithm. First, random values are assigned to all the weights. Second, a set of training data, consisting of multidimensional input vectors with matching output values, are submitted to the model. For each input, the model output is compared to the known, correct output. Third, the weights are then iteratively adjusted to reduce the MSE over the entire training set. The iterative algorithm to adjust the weights is an application of the chain rule of calculus. Derivatives of the MSE are computed, and adjustments are made using a gradient search method that propagates back down the network from layer 3 to layer 2.

Figure 2. . Input and output layers of a typical 3-layer back propagation network.



While a neural network model can be programmed from scratch, the availability of neural network software packages makes the process easier. These packages supply predefined neural network architectures, like back propagation, and include algorithms to handle the delicate iterative computation of neural network weights.

In this paper the Model Quest Miner package is utilized. The Model Quest Miner package is a modeling tool that automatically learns numeric knowledge from the data. This model is implemented as a mathematical model called Statistical Networks. A Statistical Network is a network of functional nodes. Each node contains a mathematical function that computes an output given a number of inputs. Information in a statistical network flows from the input variables through the network to the output variable.

Steps in Developing a Model

There are four basic steps to the development of a neural network model:

1. Selection of input: the raw market data variables (closing price, open interest, volume, etc.).
2. Calculation of new variables: functions of the input in Step 1. Examples include changes in volume and variance of daily changes over the immediate past.
3. Reduction of input data dimensionality.
4. Selection of neural network architecture and parameters.

These steps are repeated until a suitable model is obtained. By comparing model output with observed patterns in the input data, model weaknesses are reserved which suggests options for step 2, the creation of new technical variables.

DATA ANALYSIS

The data available for the 16 input variables were used to obtain the forecast, using the Model Quest Miner package. The estimation set for the model consisted of 18 years of data, while the evaluation set consisted of 6 years of data. The samples of the output results are presented. In addition, plots of the forecasts versus the actual number of passengers (domestic and international) for the five cities are shown in figures 3 through 12.

City of Dhahran (Domestic Travel)

The following indicators were selected as the most influencing and chosen by the model for forecasting the number of domestic passengers in the city of Dhahran: oil gross domestic product lag[1] 6 years, private non-oil gross domestic product lag 1 year, Import of goods and services lag 10 years, and population size lag 2 years. Similarly the following indicators were used

[1]The term "lag" is used to indicate data that is a certain number of years before the specific time period modeled.

for forecasting the number of international passenger in the city of Dhahran: oil gross domestic product lag 16 years, per capital income lag 5 year, population size lag 4 years, and the Dhahran's domestic flights lag 3 years.

Table 1 and figures 3 and 4 show the domestic and international actual and forecasted number of passengers for the city of Dhahran for the years 1993 through 1998. Forecasts underestimated the actual travel. The Mean Absolute Percentage Error (MAPE) for domestic travel is about 10%, while for international travel is about 3%.

Table 1. Domestic and international actual and forecasted number of passengers, Dhahran, 1993-1998

	Domestic Travel			*International Travel*		
Year	*Actual Number of Passengers*	*Forecast Number of Passengers*	*Mean Absolute Percentage Error*	*Actual Number of Passengers*	*Forecast Number of Passengers*	*Mean Absolute Percentage Error*
1993	1,713.598	1,676,565	2.16	1,228,885	1,205,433	1.9
1994	1,743,335	1,628,101	6.6	1,248,262	1,237,908	1.3
1955	1,853,441	1,588,099	14.3	1,115,282	1,079,365	3.1
1996	1,653,363	1,341,018	18.8	1,129,537	1,163,185	2.9
1997	1,984.035	1,864,543	6.1	1,172,357	1,118,611	4.5
1998	2,108,150	1,801,502	14.5	1,200,591	1,248,262	3.9

Figure 3. Domestic actual and forecasted number of passengers for the city of Dhahran for the years 1993 through 1998

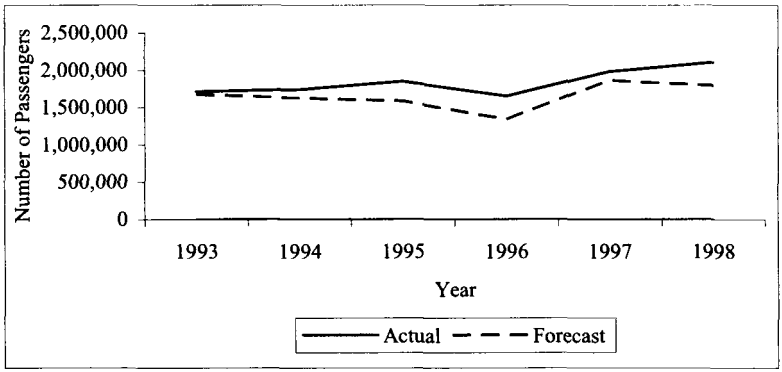
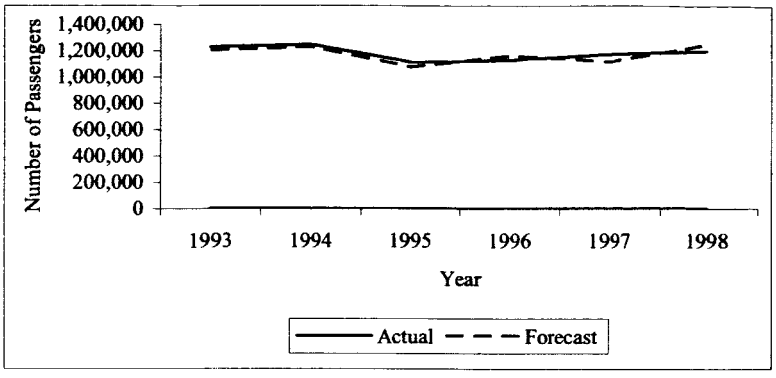


Figure 4. International actual and forecasted number of passengers for the city of Dhahran for the years 1993 through 1998



City of Madina

The following indicators were selected as the most influencing and chosen by the model for forecasting the number of domestic passengers in the city of Madina: oil gross domestic product lag 5 years, and per capita income lag 5 years. Similarly, the following indicators were used for forecasting the number of international passenger in the city of Madina: oil gross domestic product lag 10 years, per capita income lag 3 years, and Madina international flights lag 3 years.

Table 2 and figures 5 and 6 show the domestic and international actual and forecasted number of passengers for the city of Madina for the years 1993 through 1998. Forecasts underestimated the actual travel. The MAPE for domestic travel is about 8%, while for international travel is about 3%.

Table 2. Domestic and international actual and forecasted number of passengers, Madina, 1993-1998

	Domestic Travel			*International Travel*		
Year	*Actual Number of Passengers*	*Forecast Number of Passengers*	*Mean Absolute Percentage Error*	*Actual Number of Passengers*	*Forecast Number of Passengers*	*Mean Absolute Percentage Error*
1993	1,005,669	985,960	1.9	142,379	140,245	1.4
1994	1,056,551	979,008	7.3	155,334	151,919	2.1
1955	1,074,002	1,008,526	6.1	118,066	114,247	3.2
1996	955,342	859,210	10.1	122,369	118,648	3.1
1997	1,146,411	1,057,704	7.8	131,178	104,811	2.1
1998	123,065	1,057,704	14.2	164,214	155,334	5.4

Figure 5. Domestic actual and forecasted number of passengers for the city of Madina for the years 1993 through 1998

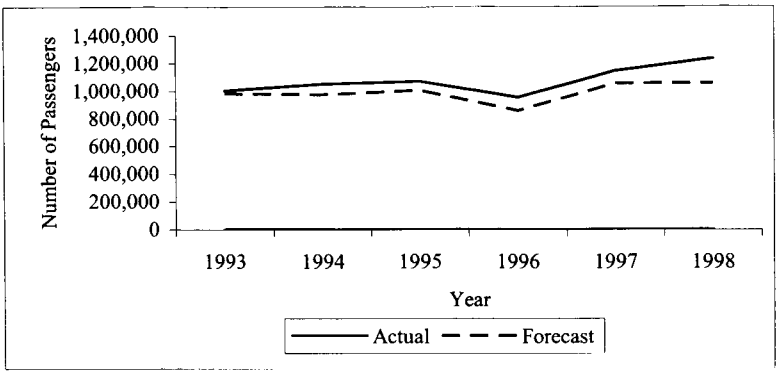
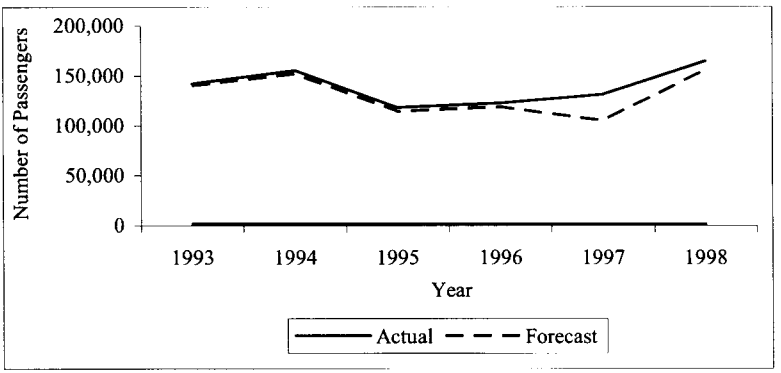


Figure 6. International actual and forecasted number of passengers for the city of Madina for the years 1993 through 1998



City of Riyadh

The following indicators were selected as the most influencing and chosen by the model for forecasting the number of domestic passenger in the city of Riyadh: oil gross domestic product lag 13 years, per capita income lag 3 years, and population size lag 2 years. Similarly, the following indicators were used for forecasting the number of international passenger in the city of Riyadh: oil gross domestic product lag 11 years, per capita income lag 1 years, total expenditures lag 2 years, and Riyadh domestic flights lag 4 years.

Table 3 and figures 7 and 8 show the domestic and international actual and forecasted number of passengers for the city of Riyadh for the years

1993 through 1998. Forecasts underestimated the actual travel. The MAPE for domestic travel is about 14%, while for international travel is about 7%.

Table 3. Domestic and international actual and forecasted number of passengers, Riyadh, 1993-1998

	Domestic Travel			*International Travel*		
Year	*Actual Number of Passengers*	*Forecast Number of Passengers*	*Mean Absolute Percentage Error*	*Actual Number of Passengers*	*Forecast Number of Passengers*	*Mean Absolute Percentage Error*
1993	5,103,385	5,049,011	1.8	2,65,5847	2,751,197	3
1994	4,182,880	4,11,5535	1.6	2,711,855	2,690,474	7
1955	5,295,891	4,315,128	18.5	2,371,369	2,317,138	4
1996	4,880,131	4,593,008	20.0	2,428,567	2,341,402	4
1997	5,616,157	4,930,858	12.2	2,527,551	2,509,063	7
1998	5,926,781	4,063,034	31.0	2,731,190	23,07,566	15

Figure 7. Domestic actual and forecasted number of passengers for the city of Riyadh for the years 1993 through 1998

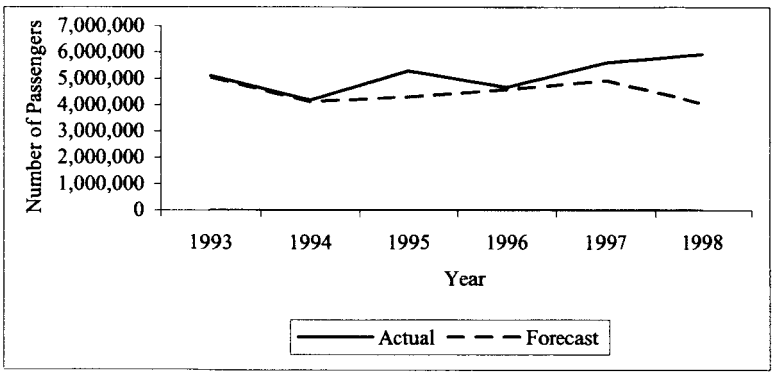
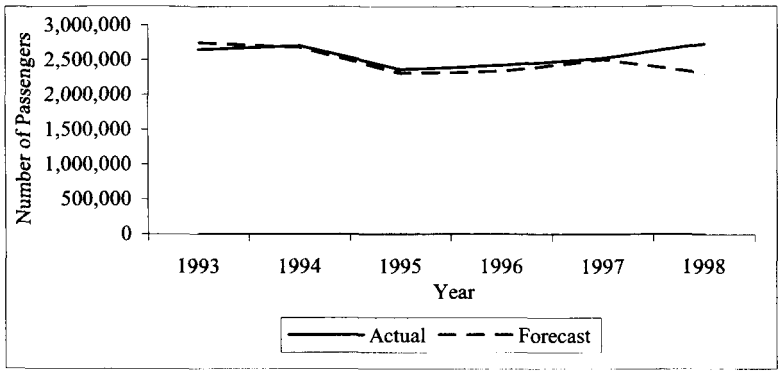


Figure 8. International actual and forecasted number of passengers for the city of Riyadh for the years 1993 through 1998



City of Jeddah

The following indicators were selected as the most influencing and chosen by the model for forecasting the number of domestic passenger in the city of Jeddah: oil gross domestic product lag 5 years, consumer price index lag 2 years, import of goods and services lag 1 year, and population size lag 3 years. Similarly, the following indicators were used for forecasting the number of international passenger in the city of Jeddah: oil gross domestic product lag 10 years and population size lag 3 years.

Table 4 and figures 9 and 10 show the domestic and international actual and forecasted number of passengers for the city of Jeddah for the years 1993 through 1998. Forecasts overestimated the actual travel. The MAPE for domestic travel is about 13%, while for international travel is about 4%.

Table 4. Domestic and international actual and forecasted number of passengers, Jeddah, 1993-1998

	Domestic Travel			*International Travel*		
Year	*Actual Number of Passengers*	*Forecast Number of Passengers*	*Mean Absolute Percentage Error*	*Actual Number of Passengers*	*Forecast Number of Passengers*	*Mean Absolute Percentage Error*
1993	4,406,475	4,353,381	1.2	4,121,391	4,135,741	0.3
1994	4,459,569	4,225,227	5.2	4,431,179	4,365,286	1.5
1955	4,761,548	4,349,457	8.5	3,783,673	3,684,908	3.6
1996	4,263,140	4,406,475	8.3	3,840,078	3,716,900	3.2
1997	5,115,758	3,504,846	14.8	4,015,412	3,868,690	3.6
1998	5,428,940	3,504,846	26.7	4,20,0361	3,978,450	5.2

Figure 9. Domestic actual and forecasted number of passengers for the city of Jeddah for the years 1993 through 1998

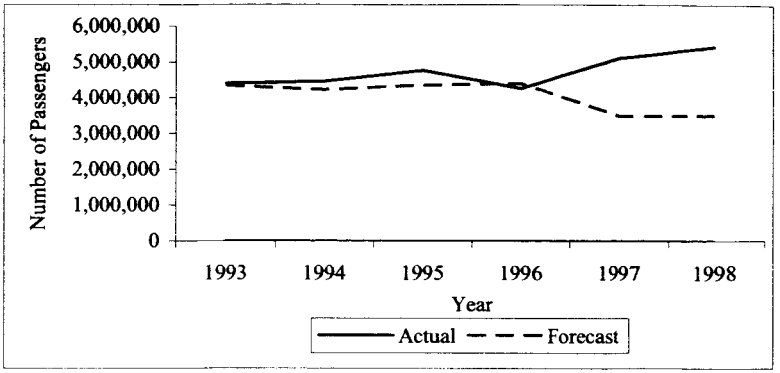
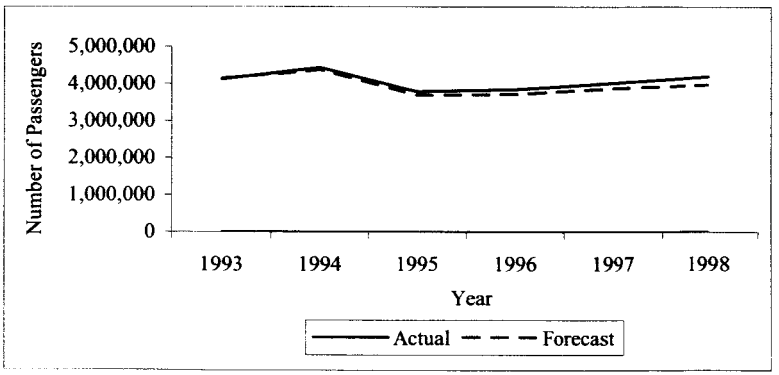


Figure 10. International actual and forecasted number of passengers for the city of Jeddah for the years 1993 through 1998



City of Taif

The following indicators were selected as the most influencing and chosen by the model for forecasting the number of domestic passenger in the city of Taif: oil gross domestic product lag 10 years, private consumption expenditures lag 2 years, and total gross domestic product lag 2 years. Similarly, the following indicators were used for forecasting the number of international passenger in the city of Taif: oil gross domestic product lag 10 years, and per capita income lag 5 years.

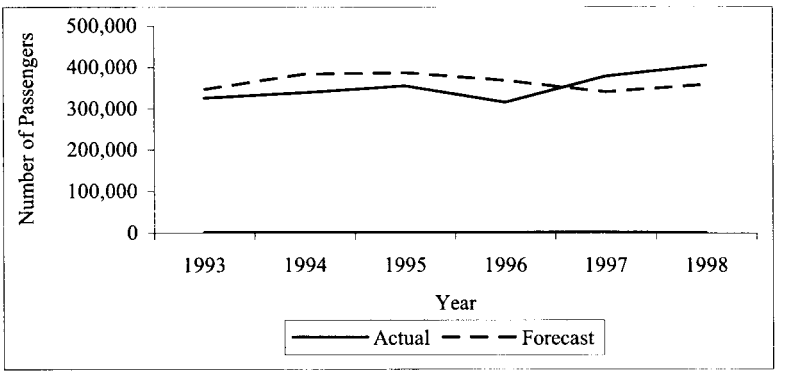
Table 5 and figures 11 and 12 show the domestic and international actual and forecasted number of passengers for the city of Taif for the years 1993-1998. Forecasts underestimated the actual domestic travel, and

overestimated the international travel. The MAPE for domestic travel is about 13%, while for international travel is about 16%.

Table 5. Domestic and international actual and forecasted number of passengers, Taif, 1993-1998

	Domestic Travel			*International Travel*		
Year	*Actual Number of Passengers*	*Forecast Number of Passengers*	*Mean Absolute Percentage Error*	*Actual Number of Passengers*	*Forecast Number of Passengers*	*Mean Absolute Percentage Error*
1993	326,172	346,818	6.3	8,914	7,748	13
1994	338,948	383,295	13.0	8,729	7,486	14
1955	355,312	386,744	8.8	6,080	5,894	3
1996	315,374	368,615	16.8	6,552	5,174	21
1997	378,449	340,517	10.0	7,034	6,427	9
1998	404,181	358,564	11.2	7,612	5,894	22

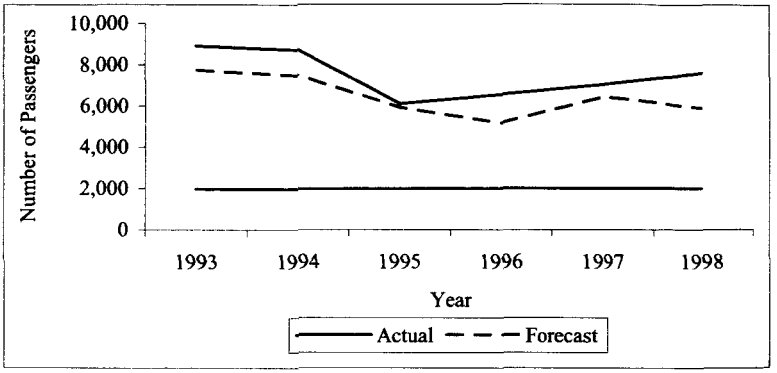
Figure 11. Domestic actual and forecasted number of passengers for the city of Taif for the years 1993-1998



RESULTS AND RECOMMENDATIONS

A suitable forecast model for the Saudi Airlines sector is essential for several reasons. In the first place, the demand is highly fluctuating and seasonal. The seasonality is chiefly due to Hajj and Umrah the two religious rituals among Muslims, which fall on Dil Hijja and Ramadan months. At each of these times, approximately 2 million pilgrims arrive in Saudi Arabia from various parts of the world. In the second place, the competition in the international sector of airline industry has caught up with the Saudi Arabian market, too, with the increased entry of foreign airline services.

Figure 12. International actual and forecasted number of passengers for the city of Taif for the years 1993-1998



Due to these reasons, results of the analysis were subjected to rigorous study. An overall examination of the data indicates that there was a general downward trend observed in both domestic and international sectors during the years 1995 to 1996. Saudi Arabian Airlines, which is the monopolist airline operators in the Kingdom, opened up several new routes beginning in 1993. Flights operated to Asmara, Orlando, Florida and several other places. This, together with the lack of new aircrafts, could have been the reason for the overall decline in the number of passengers during the 1995 to 1996 periods. However 61 new aircrafts were purchased from McDonnel and Boeing and a new corporate identity was launched in 1996. This boosted the passenger usage of the airlines.

Attempts were made to identify the crucial factors that influence airline usage. The indicators found to be most influential are shown in Table 6. It is seen that the most influential factors are oil gross domestic product and per capita income in the domestic and international sectors. Oil production is one key factor which influences most of the Saudi trading and commercial sectors. Therefore oil gross domestic product appearing as an indicator is quite understandable. Similarly population size is a deciding factor in the major cities like Dammam, Riyadh and Jeddah. The expatriate communities from India, Bangladesh and Pakistan in these major cities contribute much to the domestic as well as international services. In Jeddah the international sector forecast values closely follow the actual data. The most contributing figure in Jeddah sectors is definitely the floating population. Population size does not seem to be influencing the Madina and Taif sectors.

In view of the fluctuating nature of the passenger usage of airline services in Saudi Arabia, certain suggestions are made here. Most of these

recommendations are in order to improve the resilience of the system to the fluctuations in demand and supply.

Table 6. Factors that influence airline usage, for domestic and international travel, 1993-1998

City	*Domestic*	*International*
Dhahran	Oil gross national product Per capital income Import of goods and services Population size	Oil gross national product Per capital income Population size Dhahran domestic product
Madina	Oil gross national product Per capital income	Oil gross national product Per capital income Madina international product
Riyadh	Oil gross national product Per capital income Population size	Oil gross national product Per capital income Total expenditures Riyadh domestic product
Jeddah	Oil gross national product Consumer price index Population size	Oil gross national product Population size
Taif	Oil gross national product Private consumption expenditures Total gross domestic product	Oil gross national product Per capita income

Privatization of the airlines services. International usage of airline services is increasing every day. From the trend lines of the forecast and actual values it can be seen that there is much difference appearing in the data sets of all cities towards the end of the study period. The actual number of passengers especially in the domestic sector is more than the predicted values in all cities.

Population size. Though population size does not appear as an indicator in the Madina sector, it is a fact that pilgrims flow to the city during Hajj and Umrah periods. However most of them use road transport instead of airlines. This is mostly due to difficulties in scheduling flights to the Madina sector. Similarly though Taif is one of the most attractive tourist summer resorts in the country, airlines services usage is limited in this sector also due to inadequate flight scheduling. Solutions to these problems can be found by implementing hubbing in these sectors (Barla, 1999). Hubbing provides the airlines with increased flexibility in adjusting their capacity allocations across markets as new information about demand conditions become available. Hubbing also pools passengers from several markets into the same plane. This helps the airlines service company to lower costs of operation drastically.

REFERENCES

A Brief Outline on Planning and Research Division at Saudia. (1990). Saudi: Corporate Planning Department.

Al-Bassam, Khalid. (1997). *An econometric model for air travel demand.* Unpublished master's thesis, King Abdul Aziz University, Jeddah, Saudi Arabia.

Barla, P. (1999). Demand uncertainty and airline network morphology with strategic interactions. *Cahiers de recherché, No. 9907,* Université Laval - Département d'économique.

International Marketing Data and Statistics 1993 (18th ed.). (1993). London: Euromonitor Publications.

Update Forecast and Planning Assumptions: New Riyadh International Airport. (1979, July). Riyadh: Saudi Arabian Bechtel Company.

Index of Past Issues
Journal of Air Transportation

Volume 8
Number 1 (2003) pp. 1-212

Articles

JOURNAL OF AIR TRANSPORTATION, Vol. 9 No. 1, June, 1-124.

Volume 8
Number 2 (2003) pp. 1-147

Articles

Guidelines for Manuscript Submission
Instructions to Authors

Authors wishing to submit original manuscripts for consideration should send one double-spaced paper copy and one electronic copy either on an IBM compatible three and one-half inch diskette to the address below or via e-mail to journal@unomaha.edu.

Authors submitting manuscripts to the Journal should not simultaneously submit them to another journal, nor should manuscripts have been published elsewhere in substantially similar form or with substantially similar content. Authors in doubt about what constitutes a prior publication should consult the executive editor. Manuscripts will not be returned.

Aviation Institute/JAT
University of Nebraska at Omaha
Allwine Hall 422
6001 Dodge Street
Omaha, NE 68182-0508
U.S.A.

Format: All papers must be written in the English language. Use a 12 point font and allow for a one-inch margin on all sides. Double-space all material, including quotations, the abstract, notes, and references. All figures and tables should be on a separate page at the end of the text. Include the figure name and filename on the bottom of the page. Please proofread all article submissions for punctuation, spelling, and format errors.

The cover page should include the title of the manuscript, the author's name(s), shipping and e-mail addresses, telephone number, and a short biographical statement summarizing the author's education and current affiliation. Please note the primary contact person. The second page should contain an abstract of the manuscript. The abstract should include a concise description of the contents of the paper, the research method used, and the results. Abstracts should generally be kept to about 100 words.

Figures and Tables: Figures and tables should appear at the end of the paper with each item on a separate page. Indicate in the text the approximate location where each figure and table should be placed. Figures, tables, and the text should each be saved as a separate file. Do not embed tables and figures in the text files. Include the appropriate file name at the bottom of the page for each figure and table. Figures and tables must be camera-ready, printed in black ink only and must fit with in a four-inch by seven-inch area.

Reference Style: Due to the international participation, rigid referencing style criteria are not mandated. Acceptable reference styles of the author's country will apply. For the U.S.A., the most recent edition of the

American Psychological Association (APA) Manual of Style is preferred. Ensure all references are cited and all citations are referenced.

Review Process: A rigorous, double-blind review will be conducted by the JAT Panel of Reviewers. Additionally, a member of the Editorial Board will conduct a third review. If revisions are necessary, the editor will determine when a revised manuscript is in compliance with reviewer recommendations. Authors must make revisions to original documents and resubmit them to JAT on disk in Word or Word Perfect format or via email. All revisions must be completed within two weeks after return to the author. Manuscripts must be original, not previously published, nor under consideration for another journal while undergoing review by the JAT.

Copyrights: Copyrights are retained by the authors and the JAT. Permission to duplicate and distribute for educational purposes at no charge is granted.

Additional Information: Additional information is available on the JAT web site or by contacting the JAT directly.

JAT Home Page
http://jat.unomaha.edu/

For questions or comments contact the JAT at journal@unomaha.edu

Guidelines for Book Reviews

Books chosen for review by the Journal of Air Transportation will focus on areas of interest to its readership. These subjects include topics related to aviation and/or space transportation, both technical and non-technical. An article should be written in a concise and sufficiently non-technical language to be intelligible to both aeronautics generalists and to specialists in other fields.

Individuals wishing to nominate a book for review or who are interested in reviewing books for JAT should notify the assistant editor at the below address. Also, authors or publishers wishing to have a book considered for assessment should send a review copy to this address:

Aviation Institute
University of Nebraska at Omaha
6001 Dodge Street
Omaha, NE 68182-0508 U.S.A.

E-mail other correspondence concerning reviews to journal@unomaha.edu

Review criteria and format information for book reviews are available at the JAT web site: http://jat.unomaha.edu/. Please consider this information prior to submitting a book review.

List of Articles Accepted for Future Publication

J.T. Cocklin, "Swissair 111—Human Factors and the Transportation Safety Board of Canada's Final Air Investigation Report."

A. Ghobiral and W.A. Irvin, "Combating Air Terrorism: Some Implications to the Aviation Industry."

G. Gill, "Perception of Safety, Safety Violations, and Improvement of Safety in Aviation: Findings of a Pilot Study."

R. Snow and M. Snow, "Advanced Aviation and Aerospace GIS: Course Development and Curriculum Expansions."

M.A. Turney, J.C. Bishop, and P.C. Fitzgerald, "Measuring the Effectiveness of Recent Airport Security Interventions."

NASA Nebraska Space Grant and EPSCoR Programs

Mission

The NASA Nebraska Space Grant and EPSCoR Programs are awarded funds to develop research infrastructure and enhance the quality of aerospace research and education throughout the state. Furthermore, the NASA Nebraska Space Grant & EPSCoR Programs strive to provide national leadership in applied aspects of aeronautics.

Programs and Projects

Research Infrastructure
Higher Education
K-12 Education
General Public
External Relations
Student Fellowship and Scholarship Program

For More Information

Mary M. Fink, Coordinator
NASA Nebraska Space Grant & EPSCoR
Allwine Hall 422
University of Nebraska at Omaha
Omaha, NE 68182
Phone: (402) 554-3772
Fax: (402) 554-3781
Internet: nasa@unomaha.edu
World Wide Web: www.unomaha.edu/~nasa

Journal of Air Transportation
SUBSCRIPTION ORDER FORM

The *Journal of Air Transportation* is a refereed journal publishing articles of interest in all areas of aviation and space transportation research, policy, theory, case study, practice, and issue. ISSN 1093-8826.

Please Print or Type

Name _____

Address _____

City, State, Zip _____

Country _____

Signature _____

Type of Subscription

_____ Institutional subscription $68/year
_____ Individual subscription $35/year
_____ Hard Copy subscription
_____ CDRom subscription – includes a complete JAT historical archive
_____ For all subscriptions outside the U.S. add $20/year
_____ CD of Back Issues (1996-2000) $68

Type of Payment

_____ Purchase Order P.O. Number _____
_____ Check Enclosed (Payable to the UNO Aviation Institute)
_____ Send Invoice
_____ Visa: Expiration Date _____
_____ Master Card Expiration Date _____

Card number

Signature of cardholder Print name of cardholder

Mail order form to: UNO Aviation Institute, Attention: JAT, Allwine Hall Room 422, 6001 Dodge Street, Omaha, NE 68182-0508 U.S.A.

Phone: (402) 554-3424 **Fax:** (402) 554-3781